Department of Defense
Fiscal Year (FY) 2024 Budget Estimates

March 2023

Army

Justification Book Volume 1c of 1

Research, Development, Test & Evaluation, Army

RDT&E − Volume I, Budget Activity 3

Volume 1c Table of Contents

UNCLASSIFIED
RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY
APPROPRIATION LANGUAGE

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, $15,772,215,000.00 to remain available for obligation until September 30, 2025.

The FY 2024 Overseas Operations accounted for in the base budget are as follows:

In-theater and in-CONUS expenses that remain after combat operations cease and have been previously funded in Overseas Operations $3,166,000.00.

COST STATEMENT

The following Justification Books were prepared at a cost of $365,839.52: Aircraft (ACFT), Missiles (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 – Tactical & Support Vehicles, Other Procurement Army (OPA) 2 – Communications & Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 5C, Budget Activity 5D, Budget Activity 6, Budget Activity 7, and Budget Activity 8.

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FY 2024 RDT&E, ARMY PROGRAM ELEMENT DESCRIPTIVE SUMMARIES
Introduction and Explanation of Contents

1.   General. The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army   RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2024.

2.   Relationship of the FY 2024 Budget Submitted to Congress to the FY 2023 Budget Submitted to Congress. This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

New Start Programs:

Budget Activity	*OSDPE / Project*	*Project Title*
02	0602146A / AM6	Modular RF Communications Technology
02	0602148A / CI4	Adaptive Avionics Technologies
02	0602141A / CIC	Fire Control Lethality Technology
02	0602182A / DA8	Quantum PNT & Radio Frequency Sensing
02	0602182A / DB4	Enabling Long Standoff 3D (ELS3D) Tech
02	0602002A / DC6	Sci & Analysis for Autonomous Sys & Counter-Auton
02	0602183A / DE2	Airborne Threat Defeat
02	0602150A / DE3	Adv Beam Control Component Development for C-CM
02	0602182A / DE6	Understanding Environment as a Threat Tech
03	0603044A / CW1	Technical-SAVVY Soldier Advanced Research
03	0603116A / DB2	Future Armaments Scalable Technologies
03	0603042A / DB5	Enabling Long Standoff 3D (ELS3D) Adv Tech
03	0603463A / DB6	Pathfinder 3D Advanced Technology
04	0604103A / DG4	NAVWAR SA
04	0603779A / DH6	Installation Resilience
05	0604802A / DC9	30mm MMPA M-SHORAD INC 3

05	0604818A / DD1	Unified Network Technology Trans & Integ (UNTTI)
05	0605206A / DG3	CI and HUMINT Equipment Program-Army (CIHEP-A)
05	0605013A / DH1	Operational Medicine Information System
05	0605216A / EFA	Joint Target Integrated Cmd & Coordination Suite
05	0605036A / EQ5	Combating Weapons of Mass Destruction (CWMD)
05	0605049A / XT4	Advanced Threat Detection System (ATDS)
06	0605601A / WD1	West Desert Test Center
07	0203735A / DD4	AMPV Improvement Program
07	0607315A / DD5	Army Power Systems Modernization

Program Element/Project Restructures:

Budget Activity	Old OSDPE / Project: Title	New OSDPE / Project
02	0602145A / CU5: Next Generation Combat Vehicle Technolog	0602141A / CIA
02	0602181A / CM7: All Domain Convergence Applied Research	0602141A / CIB
02	0602143A / AZ9: Soldier Lethality Technology	0602143A / BB4
02	0602143A / BBG: Soldier Lethality Technology	0602143A / BC2
02	0602145A / BG8: Next Generation Combat Vehicle Technology	0602144A / DG1
02	0602180A / CL7: Artificial Intelligence and Machine Learning Technologies	0602180A / DE8
03	0603040A / CL6: Artificial Intelligence and Machine Learning Technologies	0603040A / DE9
03	0603463A / AR6: Network C3I Advanced Technology	0603042A / DE7
03	0603041A / CM8: All Domain Convergence Advanced Technology	0603116A / CID
03	0603462A / BH6: Next Generation Combat Vehicle Advanced Technology	0603118A / BD9
03	0603462A / BG9: Next Generation Combat Vehicle Advanced Technology	0603119A / DG2
03	0603464A / CZ8: Long Range Precision Fires Advanced Technology	0603464A / AF2
04	0604036A / BY9: Multi-Domain Sensing System (MDSS) Adv Dev	0604036A / DD6
04	0604036A / BY9: Multi-Domain Sensing System (MDSS) Adv Dev	0604036A / DD6

05	0604818A / EJ5: Family of Heavy Vehicles	0604622A / DG7
05	0605224A / CK4: Long-Range Hypersonic Weapon	0604182A / HX2
05	0605224A / CK4: All Up Round and Canister (AUR+C)	0604182A / HX2
05	0605457A / S40: Common Hypersonic Glide Body (CHGB)	0604182A / HX2
05	0605601A / F30: Ground Support Equipment (GSE)	0604182A / HX2
05	0203744A / EB6: HX6: Test and Evaluation	0604182A / HX2
05	0605224A / CK4: Multi-Domain Intelligence	0604805A / 593
05	0605224A / CK4: Multi-Domain Intelligence	0605224A / DD8
05	0605457A / S40: Multi-Domain Intelligence	0605224A / DD9
05	0605601A / F30: Army Integrated Air and Missile Defense (AIAMD)	0605457A / SS1
06	0605601A / F30: Army Integrated Air and Missile Defense (AIAMD)	0605702A / 128
07	0203744A / EB6: Army Test Ranges and Facilities	0305219A / MQ2

Program Terminations (including transfers to Procurement and Sustainment):

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Budget Activity	OSDPE / Project	Project Title
03	0603465A / AI8	Future Vertical Lift Advanced Technology / Alternative Concept Engine Advanced Technology
03	0603463A / AV4	Network C3I Advanced Technology / Foundational S&T for Network C3I Advanced Tech
04	0305251A / DD3	Cyberspace Operations Forces and Force Support / Joint Cyber Warfighting Architecture Cyber Train
04	0604115A / AX8	Technology Maturation Initiatives / Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)
04	0604115A / AX9	Technology Maturation Initiatives / Adv Mobility Experimental Prototype Adv Tech
05	0604802A / CE3	Weapons and Munitions - Eng Dev / Precision Munition (Sniper)
05	0604802A / EU4	Weapons and Munitions - Eng Dev / 40mm HV Improved High Explosive Dual Purpose
05	0604804A / FG4	Logistics and Engineer Equipment - Eng Dev / Ultra-Lightweight Camouflage Net System (ULCANS)
05	0604822A / DV6	General Fund Enterprise Business System (GFEBS) / General Fund Enterprise Business System
05	0604854A / HB6	Artillery Systems - EMD / Mobile 155MM Howitzer
05	0605013A / 184	Information Technology Development / Installation Support Modules
07	0305204A / 11A	Tactical Unmanned Aerial Vehicles / Advanced Payload Develop & Spt

07	0305206A / EH2	Airborne Reconnaissance Systems / EMARSS ADV DEV
07	0305206A / EH3	Airborne Reconnaissance Systems / EMARSS Payloads ADV DEV
08	0608041A / DD2	Defensive CYBER - Software Prototype Development / Joint Cyber Warfighting Architecture Software

3. **Classification:** This document contains no classified data. Appropriately cleared individuals can obtain further information on Classified/Special Access Programs by contacting the Department of the Army.

Department of Defense
FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment[*]	FY 2023 Total Enactment	FY 2024 Request
Research, Development, Test and Evaluation, Army	14,660,654	17,142,121	9,100	17,151,221	15,775,381
Total Research, Development, Test, & Evaluation	**14,660,654**	**17,142,121**	**9,100**	**17,151,221**	**15,775,381**

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional

 Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

Department of Defense
FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Mar 2023

	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment[*]	FY 2023 Total Enactment	FY 2024 Request
Summary Recap of Budget Activities					
Basic Research	590,078	635,395		635,395	497,455
Applied Research	1,521,472	1,823,330		1,823,330	948,358
Advanced Technology Development	2,145,309	2,532,690		2,532,690	1,455,986
Advanced Component Development & Prototypes	3,799,417	4,631,111	6,000	4,637,111	4,420,315
System Development & Demonstration	3,178,005	4,317,752	600	4,318,352	5,639,364
Management Support	1,901,655	1,820,502		1,820,502	1,624,585
Operational Systems Development	1,416,677	1,286,510	2,500	1,289,010	1,105,748
Software And Digital Technology Pilot Programs	108,041	94,831		94,831	83,570
Total Research, Development, Test, & Evaluation	**14,660,654**	**17,142,121**	**9,100**	**17,151,221**	**15,775,381**
Summary Recap of FYDP Programs					
General Purpose Forces	559,789	372,120		372,120	404,375
Intelligence and Communications	262,480	248,995		248,995	212,694
Research and Development	13,733,825	16,382,072	9,100	16,391,172	15,055,009
Central Supply and Maintenance	101,466	132,270		132,270	75,317
Administration and Associated Activities	101				
Classified Programs	2,993	6,664		6,664	27,986
Total Research, Development, Test, & Evaluation	**14,660,654**	**17,142,121**	**9,100**	**17,151,221**	**15,775,381**

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Department of the Army
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Total Obligational Authority
(Dollars in Thousands)

Mar 2023

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Applied Research	1,521,472	1,823,330		1,823,330	948,358
Advanced Technology Development	2,145,309	2,532,690		2,532,690	1,455,986
Advanced Component Development & Prototypes	3,799,417	4,631,111	6,000	4,637,111	4,420,315
System Development & Demonstration	3,178,005	4,317,752	600	4,318,352	5,639,364
Management Support	1,901,655	1,820,502		1,820,502	1,624,585
Operational Systems Development	1,416,677	1,286,510	2,500	1,289,010	1,105,748
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Total Research, Development, Test, & Evaluation	**14,660,654**	**17,142,121**	**9,100**	**17,151,221**	**15,775,381**

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Department of the Army
FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Sec	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
1	0601102A	Defense Research Sciences	01	U	358,521	391,642		391,642
2	0601103A	University Research Initiatives	01	U	88,797	107,160		107,160
3	0601104A	University and Industry Research Centers	01	U	122,521	121,160		121,160
4	0601121A	Cyber Collaborative Research Alliance	01	U	5,067	5,355		5,355
5	0601601A	Artificial Intelligence and Machine Learning Basic Research	01	U	15,172	10,078		10,078
	Basic Research				**590,078**	**635,395**		**635,395**
6	0602002A	Army Agile Innovation and Development-Applied Research	02	U		1,000		1,000
7	0602115A	Biomedical Technology	02	U	11,489			
8	0602134A	Counter Improvised-Threat Advanced Studies	02	U	1,904	6,192		6,192
9	0602141A	Lethality Technology	02	U	89,285	194,717		194,717
10	0602142A	Army Applied Research	02	U	28,654	27,833		27,833
11	0602143A	Soldier Lethality Technology	02	U	201,221	253,539		253,539
12	0602144A	Ground Technology	02	U	214,489	264,523		264,523
13	0602145A	Next Generation Combat Vehicle Technology	02	U	239,284	277,445		277,445
14	0602146A	Network C3I Technology	02	U	161,759	212,115		212,115
15	0602147A	Long Range Precision Fires Technology	02	U	107,454	128,529		128,529
16	0602148A	Future Verticle Lift Technology	02	U	130,108	104,348		104,348
17	0602150A	Air and Missile Defense Technology	02	U	92,926	88,768		88,768
18	0602180A	Artificial Intelligence and Machine Learning Technologies	02	U	14,486	16,068		16,068

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional
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Department of the Army
FY 2024 President's Budget
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Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Sec	FY 2024 Request
1	0601102A	Defense Research Sciences	01	U	296,670
2	0601103A	University Research Initiatives	01	U	75,672
3	0601104A	University and Industry Research Centers	01	U	108,946
4	0601121A	Cyber Collaborative Research Alliance	01	U	5,459
5	0601601A	Artificial Intelligence and Machine Learning Basic Research	01	U	10,708
	Basic Research				**497,455**
6	0602002A	Army Agile Innovation and Development-Applied Research	02	U	5,613
7	0602115A	Biomedical Technology	02	U	
8	0602134A	Counter Improvised-Threat Advanced Studies	02	U	6,242
9	0602141A	Lethality Technology	02	U	85,578
10	0602142A	Army Applied Research	02	U	34,572
11	0602143A	Soldier Lethality Technology	02	U	104,470
12	0602144A	Ground Technology	02	U	60,005
13	0602145A	Next Generation Combat Vehicle Technology	02	U	166,500
14	0602146A	Network C3I Technology	02	U	81,618
15	0602147A	Long Range Precision Fires Technology	02	U	34,683
16	0602148A	Future Verticle Lift Technology	02	U	73,844
17	0602150A	Air and Missile Defense Technology	02	U	33,301
18	0602180A	Artificial Intelligence and Machine Learning Technologies	02	U	24,142

Department of the Army
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Total Obligational Authority
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Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
19	0602181A	All Domain Convergence Applied Research	02	U	25,019	27,360		27,360
20	0602182A	C3I Applied Research	02	U	11,954	27,868		27,868
21	0602183A	Air Platform Applied Research	02	U	6,356	41,588		41,588
22	0602184A	Soldier Applied Research	02	U	10,660	15,716		15,716
23	0602213A	C3I Applied Cyber	02	U	12,119	13,605		13,605
24	0602386A	Biotechnology for Materials - Applied Research	02	U	19,889	21,811		21,811
25	0602785A	Manpower/Personnel/Training Technology	02	U	18,414	19,649		19,649
26	0602787A	Medical Technology	02	U	124,002	80,656		80,656
	Applied Research				**1,521,472**	**1,823,330**		**1,823,330**
27	0603002A	Medical Advanced Technology	03	U	147,287	31,588		31,588
28	0603007A	Manpower, Personnel and Training Advanced Technology	03	U	13,865	15,598		15,598
29	0603025A	Army Agile Innovation and Demonstration	03	U	21,420	20,900		20,900
30	0603040A	Artificial Intelligence and Machine Learning Advanced Technologies	03	U	876	6,395		6,395
31	0603041A	All Domain Convergence Advanced Technology	03	U	20,095	45,377		45,377
32	0603042A	C3I Advanced Technology	03	U	3,036	12,716		12,716
33	0603043A	Air Platform Advanced Technology	03	U	727	17,946		17,946
34	0603044A	Soldier Advanced Technology	03	U	858	479		479
35	0603115A	Medical Development	03	U	25,540			
36	0603116A	Lethality Advanced Technology	03	U	7,772	9,796		9,796
37	0603117A	Army Advanced Technology Development	03	U	76,815	134,874		134,874

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Department of the Army
FY 2024 President's Budget
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Total Obligational Authority

(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Sec	FY 2024 Request
19	0602181A	All Domain Convergence Applied Research	02	U	14,297
20	0602182A	C3I Applied Research	02	U	30,659
21	0602183A	Air Platform Applied Research	02	U	48,163
22	0602184A	Soldier Applied Research	02	U	18,986
23	0602213A	C3I Applied Cyber	02	U	22,714
24	0602386A	Biotechnology for Materials - Applied Research	02	U	16,736
25	0602785A	Manpower/Personnel/Training Technology	02	U	19,969
26	0602787A	Medical Technology	02	U	66,266
	Applied Research				**948,358**
27	0603002A	Medical Advanced Technology	03	U	4,147
28	0603007A	Manpower, Personnel and Training Advanced Technology	03	U	16,316
29	0603025A	Army Agile Innovation and Demonstration	03	U	23,156
30	0603040A	Artificial Intelligence and Machine Learning Advanced Technologies	03	U	13,187
31	0603041A	All Domain Convergence Advanced Technology	03	U	33,332
32	0603042A	C3I Advanced Technology	03	U	19,225
33	0603043A	Air Platform Advanced Technology	03	U	14,165
34	0603044A	Soldier Advanced Technology	03	U	1,214
35	0603115A	Medical Development	03	U	
36	0603116A	Lethality Advanced Technology	03	U	20,582
37	0603117A	Army Advanced Technology Development	03	U	136,280

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Department of the Army
FY 2024 President's Budget
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Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
38	0603118A	Soldier Lethality Advanced Technology	03	U	148,458	154,639		154,639
39	0603119A	Ground Advanced Technology	03	U	281,637	415,846		415,846
40	0603134A	Counter Improvised-Threat Simulation	03	U	23,920	21,486		21,486
41	0603386A	Biotechnology for Materials - Advanced Research	03	U	51,774	56,853		56,853
42	0603457A	C3I Cyber Advanced Development	03	U	61,426	41,354		41,354
43	0603461A	High Performance Computing Modernization Program	03	U	222,220	301,964		301,964
44	0603462A	Next Generation Combat Vehicle Advanced Technology	03	U	294,491	471,434		471,434
45	0603463A	Network C3I Advanced Technology	03	U	205,576	177,917		177,917
46	0603464A	Long Range Precision Fires Advanced Technology	03	U	138,482	202,830		202,830
47	0603465A	Future Vertical Lift Advanced Technology	03	U	255,323	272,551		272,551
48	0603466A	Air and Missile Defense Advanced Technology	03	U	125,027	99,147		99,147
49	0603920A	Humanitarian Demining	03	U	18,684	21,000		21,000
		Advanced Technology Development			**2,145,309**	**2,532,690**		**2,532,690**
51	0603305A	Army Missle Defense Systems Integration	04	U	56,579	118,001		118,001
52	0603308A	Army Space Systems Integration	04	U	25,401	30,945		30,945
53	0603327A	Air and Missile Defense Systems Engineering	04	U	15,000	15,000		15,000
54	0603619A	Landmine Warfare and Barrier - Adv Dev	04	U	44,933	55,953	6,000	61,953
55	0603639A	Tank and Medium Caliber Ammunition	04	U	61,641	51,488		51,488
56	0603645A	Armored System Modernization - Adv Dev	04	U	154,010	135,122		135,122
57	0603747A	Soldier Support and Survivability	04	U	2,791	4,060		4,060
58	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	U	113,365	72,314		72,314

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Department of the Army
FY 2024 President's Budget
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Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Sec	FY 2024 Request
38	0603118A	Soldier Lethality Advanced Technology	03	U	102,778
39	0603119A	Ground Advanced Technology	03	U	40,597
40	0603134A	Counter Improvised-Threat Simulation	03	U	21,672
41	0603386A	Biotechnology for Materials – Advanced Research	03	U	59,871
42	0603457A	C3I Cyber Advanced Development	03	U	28,847
43	0603461A	High Performance Computing Modernization Program	03	U	255,772
44	0603462A	Next Generation Combat Vehicle Advanced Technology	03	U	217,394
45	0603463A	Network C3I Advanced Technology	03	U	105,549
46	0603464A	Long Range Precision Fires Advanced Technology	03	U	153,024
47	0603465A	Future Vertical Lift Advanced Technology	03	U	158,795
48	0603466A	Air and Missile Defense Advanced Technology	03	U	21,015
49	0603920A	Humanitarian Demining	03	U	9,068
	Advanced Technology Development				**1,455,986**
51	0603305A	Army Missle Defense Systems Integration	04	U	12,904
52	0603308A	Army Space Systems Integration	04	U	19,120
53	0603327A	Air and Missile Defense Systems Engineering	04	U	
54	0603619A	Landmine Warfare and Barrier – Adv Dev	04	U	47,537
55	0603639A	Tank and Medium Caliber Ammunition	04	U	91,323
56	0603645A	Armored System Modernization – Adv Dev	04	U	43,026
57	0603747A	Soldier Support and Survivability	04	U	3,550
58	0603766A	Tactical Electronic Surveillance System – Adv Dev	04	U	65,567

Department of the Army
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Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment[*]	FY 2023 Total Enactment
59	0603774A	Night Vision Systems Advanced Development	04	U	62,534	97,478		97,478
60	0603779A	Environmental Quality Technology - Dem/Val	04	U	22,491	76,749		76,749
61	0603790A	NATO Research and Development	04	U	3,639	3,805		3,805
62	0603801A	Aviation - Adv Dev	04	U	1,138,457	1,157,472		1,157,472
63	0603804A	Logistics and Engineer Equipment - Adv Dev	04	U	10,797	24,638		24,638
64	0603807A	Medical Systems - Adv Dev	04	U	27,768	5,598		5,598
65	0603827A	Soldier Systems - Advanced Development	04	U	25,288	23,444		23,444
66	0604017A	Robotics Development	04	U	78,309	26,555		26,555
67	0604019A	Expanded Mission Area Missile (EMAM)	04	U	26,855	258,320		258,320
68	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04	U		77,000		77,000
69	0604035A	Low Earth Orbit (LEO) Satellite Capability	04	U	18,922	35,509		35,509
70	0604036A	Multi-Domain Sensing System (MDSS) Adv Dev	04	U	50,548	47,915		47,915
71	0604037A	Tactical Intel Targeting Access Node (TITAN) Adv Dev	04	U	28,347	863		863
72	0604100A	Analysis Of Alternatives	04	U	9,723	10,659		10,659
73	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04	U	892	1,425		1,425
74	0604103A	Electronic Warfare Planning and Management Tool (EWPMT)	04	U				
75	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	U	76,349	134,719		134,719
76	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	U	408,766	380,147		380,147
77	0604115A	Technology Maturation Initiatives	04	U	127,725	219,742		219,742
78	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	U	37,939	274,838		274,838

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional
 Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

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Line No	Program Element Number	Item	Act	Se c	FY 2024 Request
59	0603774A	Night Vision Systems Advanced Development	04	U	73,675
60	0603779A	Environmental Quality Technology - Dem/Val	04	U	31,720
61	0603790A	NATO Research and Development	04	U	4,143
62	0603801A	Aviation - Adv Dev	04	U	1,502,160
63	0603804A	Logistics and Engineer Equipment - Adv Dev	04	U	7,604
64	0603807A	Medical Systems - Adv Dev	04	U	1,602
65	0603827A	Soldier Systems - Advanced Development	04	U	27,681
66	0604017A	Robotics Development	04	U	3,024
67	0604019A	Expanded Mission Area Missile (EMAM)	04	U	97,018
68	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04	U	117,557
69	0604035A	Low Earth Orbit (LEO) Satellite Capability	04	U	38,851
70	0604036A	Multi-Domain Sensing System (MDSS) Adv Dev	04	U	191,394
71	0604037A	Tactical Intel Targeting Access Node (TITAN) Adv Dev	04	U	10,626
72	0604100A	Analysis Of Alternatives	04	U	11,095
73	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04	U	5,144
74	0604103A	Electronic Warfare Planning and Management Tool (EWPMT)	04	U	2,260
75	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	U	53,143
76	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	U	816,663
77	0604115A	Technology Maturation Initiatives	04	U	281,314
78	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	U	281,239

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Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
79	0604119A	Army Advanced Component Development & Prototyping	04	U	179,483	198,111		198,111
80	0604120A	Assured Positioning, Navigation and Timing (PNT)	04	U	80,858	57,620		57,620
81	0604121A	Synthetic Training Environment Refinement & Prototyping	04	U	198,815	242,468		242,468
82	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04	U	12,891	14,840		14,840
83	0604135A	Strategic Mid-Range Fires	04	U		404,291		404,291
84	0604182A	Hypersonics	04	U	305,406	238,168		238,168
85	0604403A	Future Interceptor	04	U	6,643	8,179		8,179
86	0604531A	Counter - Small Unmanned Aircraft Systems Advanced Development	04	U	18,449	35,110		35,110
87	0604541A	Unified Network Transport	04	U	33,879	36,966		36,966
88	0604644A	Mobile Medium Range Missile	04	U	275,989			
89	0604785A	Integrated Base Defense (Budget Activity 4)	04	U	2,040			
90	0305251A	Cyberspace Operations Forces and Force Support	04	U	55,895	55,599		55,599
999	999999999	Classified Programs	04	U				
		Advanced Component Development & Prototypes			**3,799,417**	**4,631,111**	**6,000**	**4,637,111**
91	0604201A	Aircraft Avionics	05	U	6,411	3,335		3,335
92	0604270A	Electronic Warfare Development	05	U	29,683	4,140		4,140
93	0604601A	Infantry Support Weapons	05	U	77,027	83,329		83,329
94	0604604A	Medium Tactical Vehicles	05	U	9,177	22,163		22,163
95	0604611A	JAVELIN	05	U	8,202	16,186		16,186

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional
 Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

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Line No	Program Element Number	Item	Act	Sec	FY 2024 Request
79	0604119A	Army Advanced Component Development & Prototyping	04	U	204,914
80	0604120A	Assured Positioning, Navigation and Timing (PNT)	04	U	40,930
81	0604121A	Synthetic Training Environment Refinement & Prototyping	04	U	109,714
82	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04	U	16,426
83	0604135A	Strategic Mid-Range Fires	04	U	31,559
84	0604182A	Hypersonics	04	U	43,435
85	0604403A	Future Interceptor	04	U	8,040
86	0604531A	Counter - Small Unmanned Aircraft Systems Advanced Development	04	U	64,242
87	0604541A	Unified Network Transport	04	U	40,915
88	0604644A	Mobile Medium Range Missile	04	U	
89	0604785A	Integrated Base Defense (Budget Activity 4)	04	U	
90	0305251A	Cyberspace Operations Forces and Force Support	04	U	
999	999999999	Classified Programs	04	U	19,200
	Advanced Component Development & Prototypes				**4,420,315**
91	0604201A	Aircraft Avionics	05	U	13,673
92	0604270A	Electronic Warfare Development	05	U	12,789
93	0604601A	Infantry Support Weapons	05	U	64,076
94	0604604A	Medium Tactical Vehicles	05	U	28,226
95	0604611A	JAVELIN	05	U	7,827

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Line No	Program Element Number	Item	Act	Sec	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
96	0604622A	Family of Heavy Tactical Vehicles	05	U	27,406	53,014		53,014
97	0604633A	Air Traffic Control	05	U	4,244	2,623		2,623
98	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05	U		109,849		109,849
99	0604642A	Light Tactical Wheeled Vehicles	05	U	1,980			
100	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	U	118,296	63,131		63,131
101	0604710A	Night Vision Systems - Eng Dev	05	U	41,831	92,951		92,951
102	0604713A	Combat Feeding, Clothing, and Equipment	05	U	1,598	1,566		1,566
103	0604715A	Non-System Training Devices - Eng Dev	05	U	28,605	18,588		18,588
104	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	U	58,633	55,541		55,541
105	0604742A	Constructive Simulation Systems Development	05	U	21,424	29,481		29,481
106	0604746A	Automatic Test Equipment Development	05	U	8,486	5,178		5,178
107	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	U	12,182	8,189		8,189
108	0604798A	Brigade Analysis, Integration and Evaluation	05	U	20,976	21,086		21,086
109	0604802A	Weapons and Munitions - Eng Dev	05	U	287,787	285,778	600	286,378
110	0604804A	Logistics and Engineer Equipment - Eng Dev	05	U	49,201	75,669		75,669
111	0604805A	Command, Control, Communications Systems - Eng Dev	05	U	19,372	44,993		44,993
112	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	U	43,023	5,513		5,513
113	0604808A	Landmine Warfare/Barrier - Eng Dev	05	U	28,622	37,150		37,150
114	0604818A	Army Tactical Command & Control Hardware & Software	05	U	146,291	131,190		131,190
115	0604820A	Radar Development	05	U	124,832	71,259		71,259

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96	0604622A	Family of Heavy Tactical Vehicles	05	U	44,197
97	0604633A	Air Traffic Control	05	U	1,134
98	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05	U	142,125
99	0604642A	Light Tactical Wheeled Vehicles	05	U	53,564
100	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	U	102,201
101	0604710A	Night Vision Systems - Eng Dev	05	U	48,720
102	0604713A	Combat Feeding, Clothing, and Equipment	05	U	2,223
103	0604715A	Non-System Training Devices - Eng Dev	05	U	21,441
104	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	U	74,738
105	0604742A	Constructive Simulation Systems Development	05	U	30,985
106	0604746A	Automatic Test Equipment Development	05	U	13,626
107	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	U	8,802
108	0604798A	Brigade Analysis, Integration and Evaluation	05	U	20,828
109	0604802A	Weapons and Munitions - Eng Dev	05	U	243,851
110	0604804A	Logistics and Engineer Equipment - Eng Dev	05	U	37,420
111	0604805A	Command, Control, Communications Systems - Eng Dev	05	U	34,214
112	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	U	6,496
113	0604808A	Landmine Warfare/Barrier - Eng Dev	05	U	13,581
114	0604818A	Army Tactical Command & Control Hardware & Software	05	U	168,574
115	0604820A	Radar Development	05	U	94,944

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Line No	Program Element Number	Item	Act	Sec	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
116	0604822A	General Fund Enterprise Business System (GFEBS)	05	U	15,395	10,402		10,402
117	0604827A	Soldier Systems - Warrior Dem/Val	05	U	6,219	19,408		19,408
118	0604852A	Suite of Survivability Enhancement Systems - EMD	05	U	93,207	100,384		100,384
119	0604854A	Artillery Systems - EMD	05	U	25,000	48,106		48,106
120	0605013A	Information Technology Development	05	U	125,109	104,134		104,134
121	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	U	65,230	67,519		67,519
122	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	U	34,262			
123	0605030A	Joint Tactical Network Center (JTNC)	05	U	15,752	17,936		17,936
124	0605031A	Joint Tactical Network (JTN)	05	U	27,849	30,150		30,150
125	0605035A	Common Infrared Countermeasures (CIRCM)	05	U	15,982	11,523		11,523
126	0605036A	Combating Weapons of Mass Destruction (CWMD) Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV)	05	U				
127	0605038A	Sensor Suite	05	U	7,340			
128	0605041A	Defensive CYBER Tool Development	05	U	18,811	39,029		39,029
129	0605042A	Tactical Network Radio Systems (Low-Tier)	05	U	27,688	4,426		4,426
130	0605047A	Contract Writing System	05	U	20,195	13,742		13,742
131	0605049A	Missile Warning System Modernization (MWSM)	05	U				
132	0605051A	Aircraft Survivability Development	05	U	60,127	19,123		19,123
133	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	U	175,604	131,093		131,093
134	0605053A	Ground Robotics	05	U	15,763	26,809		26,809
135	0605054A	Emerging Technology Initiatives	05	U	219,284	244,047		244,047

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional
  Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

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116	0604822A	General Fund Enterprise Business System (GFEBS)	05	U	2,965
117	0604827A	Soldier Systems - Warrior Dem/Val	05	U	11,333
118	0604852A	Suite of Survivability Enhancement Systems - EMD	05	U	79,250
119	0604854A	Artillery Systems - EMD	05	U	42,490
120	0605013A	Information Technology Development	05	U	104,024
121	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	U	102,084
122	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	U	
123	0605030A	Joint Tactical Network Center (JTNC)	05	U	18,662
124	0605031A	Joint Tactical Network (JTN)	05	U	30,328
125	0605035A	Common Infrared Countermeasures (CIRCM)	05	U	11,509
126	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	U	1,050
127	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	U	
128	0605041A	Defensive CYBER Tool Development	05	U	27,714
129	0605042A	Tactical Network Radio Systems (Low-Tier)	05	U	4,318
130	0605047A	Contract Writing System	05	U	16,355
131	0605049A	Missile Warning System Modernization (MWSM)	05	U	27,571
132	0605051A	Aircraft Survivability Development	05	U	24,900
133	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	U	196,248
134	0605053A	Ground Robotics	05	U	35,319
135	0605054A	Emerging Technology Initiatives	05	U	201,274

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Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
136	0605143A	Biometrics Enabling Capability (BEC)	05	U	4,326	11,091		11,091
137	0605144A	Next Generation Load Device - Medium	05	U	14,835	22,439		22,439
138	0605145A	Medical Products and Support Systems Development	05	U	927			
139	0605148A	Tactical Intel Targeting Access Node (TITAN) EMD	05	U	54,972	108,987		108,987
140	0605203A	Army System Development & Demonstration	05	U	122,175	143,616		143,616
141	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05	U	2,192	6,530		6,530
142	0605206A	CI and HUMINT Equipment Program-Army (CIHEP-A)	05	U				
143	0605216A	Joint Targeting Integrated Command and Coordination Suite (JTIC2S)	05	U				
144	0605224A	Multi-Domain Intelligence	05	U	9,313	6,008		6,008
145	0605225A	SIO Capability Development	05	U	22,713			
146	0605231A	Precision Strike Missile (PrSM)	05	U	181,574	259,506		259,506
147	0605232A	Hypersonics EMD	05	U	107,404	633,499		633,499
148	0605233A	Accessions Information Environment (AIE)	05	U	16,177	10,088		10,088
149	0605235A	Strategic Mid-Range Capability	05	U		5,016		5,016
150	0605236A	Integrated Tactical Communications	05	U		12,447		12,447
151	0605450A	Joint Air-to-Ground Missile (JAGM)	05	U	2,467	2,366		2,366
152	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	U	154,257	263,545		263,545
153	0605531A	Counter - Small Unmanned Aircraft Systems Sys Dev & Demonstration	05	U	49,667	14,892		14,892
154	0605625A	Manned Ground Vehicle	05	U	194,936	554,925		554,925
155	0605766A	National Capabilities Integration (MIP)	05	U	13,454	17,030		17,030

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 Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

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136	0605143A	Biometrics Enabling Capability (BEC)	05	U	
137	0605144A	Next Generation Load Device - Medium	05	U	36,970
138	0605145A	Medical Products and Support Systems Development	05	U	
139	0605148A	Tactical Intel Targeting Access Node (TITAN) EMD	05	U	132,136
140	0605203A	Army System Development & Demonstration	05	U	81,657
141	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05	U	31,284
142	0605206A	CI and HUMINT Equipment Program-Army (CIHEP-A)	05	U	2,170
143	0605216A	Joint Targeting Integrated Command and Coordination Suite (JTIC2S)	05	U	9,290
144	0605224A	Multi-Domain Intelligence	05	U	41,003
145	0605225A	SIO Capability Development	05	U	
146	0605231A	Precision Strike Missile (PrSM)	05	U	272,786
147	0605232A	Hypersonics EMD	05	U	900,920
148	0605233A	Accessions Information Environment (AIE)	05	U	27,361
149	0605235A	Strategic Mid-Range Capability	05	U	348,855
150	0605236A	Integrated Tactical Communications	05	U	22,901
151	0605450A	Joint Air-to-Ground Missile (JAGM)	05	U	3,014
152	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	U	284,095
153	0605531A	Counter - Small Unmanned Aircraft Systems Sys Dev & Demonstration	05	U	36,016
154	0605625A	Manned Ground Vehicle	05	U	996,653
155	0605766A	National Capabilities Integration (MIP)	05	U	15,129

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156	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	U	2,470	9,376		9,376
157	0605830A	Aviation Ground Support Equipment	05	U	1,158	2,959		2,959
158	0303032A	TROJAN - RH12	05	U	3,362	3,761		3,761
159	0304270A	Electronic Warfare Development	05	U	75,520	99,938		99,938
	System Development & Demonstration				**3,178,005**	**4,317,752**	**600**	**4,318,352**
160	0604256A	Threat Simulator Development	06	U	60,749	138,937		138,937
161	0604258A	Target Systems Development	06	U	41,769	64,132		64,132
162	0604759A	Major T&E Investment	06	U	91,130	142,031		142,031
163	0605103A	Rand Arroyo Center	06	U	31,087	33,631		33,631
164	0605301A	Army Kwajalein Atoll	06	U	242,279	309,005		309,005
165	0605326A	Concepts Experimentation Program	06	U	80,386	86,824		86,824
166	0605502A	Small Business Innovative Research	06	U	374,118			
167	0605601A	Army Test Ranges and Facilities	06	U	362,223	417,567		417,567
168	0605602A	Army Technical Test Instrumentation and Targets	06	U	57,584	67,962		67,962
169	0605604A	Survivability/Lethality Analysis	06	U	35,042	36,500		36,500
170	0605606A	Aircraft Certification	06	U	2,398	4,777		4,777
171	0605702A	Meteorological Support to RDT&E Activities	06	U	6,389	6,958		6,958
172	0605706A	Materiel Systems Analysis	06	U	20,771	22,004		22,004
173	0605709A	Exploitation of Foreign Items	06	U	13,631	6,186		6,186
174	0605712A	Support of Operational Testing	06	U	54,797	70,718		70,718

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Line No	Program Element Number	Item	Act	Se c	FY 2024 Request
156	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	U	27,243
157	0605830A	Aviation Ground Support Equipment	05	U	1,167
158	0303032A	TROJAN - RH12	05	U	3,879
159	0304270A	Electronic Warfare Development	05	U	137,186
	System Development & Demonstration				**5,639,364**
160	0604256A	Threat Simulator Development	06	U	38,492
161	0604258A	Target Systems Development	06	U	11,873
162	0604759A	Major T&E Investment	06	U	76,167
163	0605103A	Rand Arroyo Center	06	U	37,078
164	0605301A	Army Kwajalein Atoll	06	U	314,872
165	0605326A	Concepts Experimentation Program	06	U	95,551
166	0605502A	Small Business Innovative Research	06	U	
167	0605601A	Army Test Ranges and Facilities	06	U	439,118
168	0605602A	Army Technical Test Instrumentation and Targets	06	U	42,220
169	0605604A	Survivability/Lethality Analysis	06	U	37,518
170	0605606A	Aircraft Certification	06	U	2,718
171	0605702A	Meteorological Support to RDT&E Activities	06	U	
172	0605706A	Materiel Systems Analysis	06	U	26,902
173	0605709A	Exploitation of Foreign Items	06	U	7,805
174	0605712A	Support of Operational Testing	06	U	75,133

Department of the Army
FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Sec	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
175	0605716A	Army Evaluation Center	06	U	65,693	67,058		67,058
176	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	U	2,537	6,097		6,097
177	0605801A	Programwide Activities	06	U	90,443	89,793		89,793
178	0605803A	Technical Information Activities	06	U	31,174	37,652		37,652
179	0605805A	Munitions Standardization, Effectiveness and Safety	06	U	54,922	60,645		60,645
180	0605857A	Environmental Quality Technology Mgmt Support	06	U	1,724	1,912		1,912
181	0605898A	Army Direct Report Headquarters – R&D – MHA	06	U	48,798	53,271		53,271
182	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	U	78,187	89,602		89,602
183	0606003A	CounterIntel and Human Intel Modernization	06	U	10,641	1,424		1,424
184	0606105A	Medical Program-Wide Activities	06	U	37,616			
185	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	U	5,466	5,816		5,816
186	0909999A	Financing for Cancelled Account Adjustments	06	U	101			
	Management Support				**1,901,655**	**1,820,502**		**1,820,502**
187	0603778A	MLRS Product Improvement Program	07	U	11,865	18,463		18,463
188	0605024A	Anti-Tamper Technology Support	07	U	8,544	9,284		9,284
189	0607131A	Weapons and Munitions Product Improvement Programs	07	U	39,994	54,674	2,500	57,174
190	0607136A	Blackhawk Product Improvement Program	07	U	14,599			
191	0607137A	Chinook Product Improvement Program	07	U	65,960	67,513		67,513
192	0607139A	Improved Turbine Engine Program	07	U	250,533	228,036		228,036
193	0607142A	Aviation Rocket System Product Improvement and Development	07	U	8,831	11,312		11,312

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional
 Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

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FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Se c	FY 2024 Request
175	0605716A	Army Evaluation Center	06	U	71,118
176	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	U	11,204
177	0605801A	Programwide Activities	06	U	93,895
178	0605803A	Technical Information Activities	06	U	31,327
179	0605805A	Munitions Standardization, Effectiveness and Safety	06	U	50,409
180	0605857A	Environmental Quality Technology Mgmt Support	06	U	1,629
181	0605898A	Army Direct Report Headquarters - R&D - MHA	06	U	55,843
182	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	U	91,340
183	0606003A	CounterIntel and Human Intel Modernization	06	U	6,348
184	0606105A	Medical Program-Wide Activities	06	U	
185	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	U	6,025
186	0909999A	Financing for Cancelled Account Adjustments	06	U	
Management Support					**1,624,585**
187	0603778A	MLRS Product Improvement Program	07	U	14,465
188	0605024A	Anti-Tamper Technology Support	07	U	7,472
189	0607131A	Weapons and Munitions Product Improvement Programs	07	U	8,425
190	0607136A	Blackhawk Product Improvement Program	07	U	1,507
191	0607137A	Chinook Product Improvement Program	07	U	9,265
192	0607139A	Improved Turbine Engine Program	07	U	201,247
193	0607142A	Aviation Rocket System Product Improvement and Development	07	U	3,014

Department of the Army
FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority

(Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
194	0607143A	Unmanned Aircraft System Universal Products	07	U	4,426	10,512		10,512
195	0607145A	Apache Future Development	07	U	9,700	25,074		25,074
196	0607148A	AN/TPQ-53 Counterfire Target Acquisition Radar System	07	U	46,009	61,559		61,559
197	0607150A	Intel Cyber Development	07	U	3,611	13,343		13,343
198	0607312A	Army Operational Systems Development	07	U	28,029	26,131		26,131
199	0607313A	Electronic Warfare Development	07	U	5,673	6,432		6,432
200	0607315A	Enduring Turbine Engines and Power Systems	07	U				
201	0607665A	Family of Biometrics	07	U	1,101	1,114		1,114
202	0607865A	Patriot Product Improvement	07	U	125,851	152,312		152,312
203	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07	U	24,556	19,311		19,311
204	0203735A	Combat Vehicle Improvement Programs	07	U	272,438	194,229		194,229
205	0203743A	155mm Self-Propelled Howitzer Improvements	07	U	168,683	116,510		116,510
206	0203744A	Aircraft Modifications/Product Improvement Programs	07	U	10,000			
207	0203752A	Aircraft Engine Component Improvement Program	07	U	127	148		148
208	0203758A	Digitization	07	U	3,759			
209	0203801A	Missile/Air Defense Product Improvement Program	07	U	122	3,109		3,109
210	0203802A	Other Missile Product Improvement Programs	07	U	9,956	9,027		9,027
211	0205412A	Environmental Quality Technology - Operational System Dev	07	U	253	793		793
212	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	U	58,516	20,180		20,180
213	0208053A	Joint Tactical Ground System	07	U	11,379	8,813		8,813

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional

  Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

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(Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Sec	FY 2024 Request
194	0607143A	Unmanned Aircraft System Universal Products	07	U	25,393
195	0607145A	Apache Future Development	07	U	10,547
196	0607148A	AN/TPQ-53 Counterfire Target Acquisition Radar System	07	U	54,167
197	0607150A	Intel Cyber Development	07	U	4,345
198	0607312A	Army Operational Systems Development	07	U	19,000
199	0607313A	Electronic Warfare Development	07	U	6,389
200	0607315A	Enduring Turbine Engines and Power Systems	07	U	2,411
201	0607665A	Family of Biometrics	07	U	797
202	0607865A	Patriot Product Improvement	07	U	177,197
203	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07	U	42,177
204	0203735A	Combat Vehicle Improvement Programs	07	U	146,635
205	0203743A	155mm Self-Propelled Howitzer Improvements	07	U	122,902
206	0203744A	Aircraft Modifications/Product Improvement Programs	07	U	
207	0203752A	Aircraft Engine Component Improvement Program	07	U	146
208	0203758A	Digitization	07	U	1,515
209	0203801A	Missile/Air Defense Product Improvement Program	07	U	4,520
210	0203802A	Other Missile Product Improvement Programs	07	U	10,044
211	0205412A	Environmental Quality Technology - Operational System Dev	07	U	281
212	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	U	75,952
213	0208053A	Joint Tactical Ground System	07	U	203

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FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Se c	FY 2022 Actuals	FY 2023 Less Supplementals Enactment	FY 2023 Supplementals Enactment*	FY 2023 Total Enactment
216	0303028A	Security and Intelligence Activities	07	U	24,506			
217	0303140A	Information Systems Security Program	07	U	15,680	17,209		17,209
218	0303141A	Global Combat Support System	07	U	43,643	22,600		22,600
219	0303142A	SATCOM Ground Environment (SPACE)	07	U	16,186	18,297		18,297
222	0305179A	Integrated Broadcast Service (IBS)	07	U	5,430	9,926		9,926
223	0305204A	Tactical Unmanned Aerial Vehicles	07	U	8,410	4,500		4,500
224	0305206A	Airborne Reconnaissance Systems	07	U	11,782	17,165		17,165
225	0305219A	MQ-1C Gray Eagle UAS	07	U				
226	0307665A	Biometrics Enabled Intelligence	07	U	2,066			
227	0708045A	End Item Industrial Preparedness Activities	07	U	101,466	132,270		132,270
999	999999999	Classified Programs	07	U	2,993	6,664		6,664
		Operational Systems Development			1,416,677	1,286,510	2,500	1,289,010
228	0608041A	Defensive CYBER - Software Prototype Development	08	U	108,041	94,831		94,831
		Software And Digital Technology Pilot Programs			108,041	94,831		94,831
		Total Research, Development, Test and Evaluation, Army			14,660,654	17,142,121	9,100	17,151,221

*Includes enacted funding in the Ukraine Supplemental Appropriation Act, 2023 (Division B of Public Law 117-180) and Additional
  Ukraine Supplemental Appropriation Act, 2023 (Division M of Public Law 117-328).

Department of the Army
FY 2024 President's Budget
Exhibit R-1 FY 2024 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Mar 2023

Appropriation: 2040A Research, Development, Test and Evaluation, Army

Line No	Program Element Number	Item	Act	Se c	FY 2024 Request
216	0303028A	Security and Intelligence Activities	07	U	301
217	0303140A	Information Systems Security Program	07	U	15,323
218	0303141A	Global Combat Support System	07	U	13,082
219	0303142A	SATCOM Ground Environment (SPACE)	07	U	26,838
222	0305179A	Integrated Broadcast Service (IBS)	07	U	9,456
223	0305204A	Tactical Unmanned Aerial Vehicles	07	U	
224	0305206A	Airborne Reconnaissance Systems	07	U	
225	0305219A	MQ-1C Gray Eagle UAS	07	U	6,629
226	0307665A	Biometrics Enabled Intelligence	07	U	
227	0708045A	End Item Industrial Preparedness Activities	07	U	75,317
999	999999999	Classified Programs	07	U	8,786
		Operational Systems Development			**1,105,748**
228	0608041A	Defensive CYBER – Software Prototype Development	08	U	83,570
		Software And Digital Technology Pilot Programs			**83,570**

Total Research, Development, Test and Evaluation, Army　　　　　　　　15,775,381

Program Element Table of Contents (by Budget Activity then Line Item Number)

Appropriation 2040: Research, Development, Test & Evaluation, Army

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Appropriation 2040: Research, Development, Test & Evaluation, Army

Program Element Table of Contents (Alphabetically by Program Element Title)

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603002A I Medical Advanced Technology						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	147.287	31.588	4.147	-	4.147	3.106	2.042	2.044	2.066	0.000	192.280
814: *NEUROFIBROMATOSIS (CA)*	-	20.000	-	-	-	-	-	-	-	-	0.000	20.000
945: *BREAST CANCER STAMP PROCEEDS*	-	0.523	-	-	-	-	-	-	-	-	0.000	0.523
97T: *NEUROTOXIN EXPOSURE TREATMENT (CA)*	-	16.000	-	-	-	-	-	-	-	-	0.000	16.000
CJ3: *Prophylactic for Endemic Diarrheal Diseases*	-	3.863	-	-	-	-	-	-	-	-	0.000	3.863
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	-	68.000	26.381	-	-	-	-	-	-	-	0.000	94.381
MM7: *Enabling Med Cap to Support Dispersed OPS Adv Tech*	-	3.120	0.749	0.856	-	0.856	1.036	1.037	1.038	1.049	0.000	8.885
MN3: *Immediate Cardiopulmonary Stabilization Adv Tech*	-	1.702	-	-	-	-	-	-	-	-	0.000	1.702
MN4: *Advanced Life Support Advanced Technology*	-	3.797	-	-	-	-	-	-	-	-	0.000	3.797
MN5: *Next Generation Blood Products Advanced Technology*	-	9.275	-	-	-	-	-	-	-	-	0.000	9.275
MN6: *Blast & Head Impact Exposure Monitor Advanced Tech*	-	1.490	1.168	-	-	-	-	-	-	-	0.000	2.658
MN7: *Musculoskeletal Injury Screening Tool Adv Tech*	-	1.604	1.276	0.762	-	0.762	0.827	0.484	0.485	0.490	0.000	5.928
MN9: *Far Forward Behavioral Health Care Advanced Tech*	-	0.273	-	-	-	-	-	-	-	-	0.000	0.273

PE 0603002A: *Medical Advanced Technology*
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Exhibit R-2, **RDT&E Budget Item Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)*				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*							
MO2: *Traumatic Brain Injury (TBI) Treatment Adv Tech*	-	10.418	-	-	-	-	-	-	-	-	0.000	10.418
MO4: *Burn Recovery Optimization Advanced Technology*	-	2.035	-	-	-	-	-	-	-	-	0.000	2.035
MO7: *Improved Bone Repair Advanced Technology*	-	1.050	-	-	-	-	-	-	-	-	0.000	1.050
MO8: *Expeditionary Performance Nutrition Advanced Techn*	-	1.929	0.175	0.731	-	0.731	0.164	0.164	0.164	0.166	0.000	3.493
MP3: *Phys Chem Toxicity Assessment Sys Adv Tech*	-	2.208	1.839	1.798	-	1.798	1.079	0.357	0.357	0.361	0.000	7.999

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates advanced medical technologies including drugs, vaccines, medical diagnostic devices, measures for identification and vector control, and developing medical practices and procedures to effectively protect and improve the survivability of United States Forces across the entire spectrum of military operations. Tri-Service coordination and cooperative efforts are focused in four principal medical areas: Combat Casualty Care, Military Operational Medicine, Militarily Relevant Infectious Diseases, and Clinical and Rehabilitative Medicine. Starting in Fiscal Year 2020 (FY20), the principal area of Clinical and Rehabilitative Medicine is replaced with the area of Medical Assist Support Technologies.

Promising medical technologies are refined and validated through extensive testing, which is conducted in compliance with Food and Drug Administration (FDA) regulations for human medical products, and environmental protection agency (EPA) regulations for insect-control products that impact humans or the environment (e.g., repellents and insecticides). The FDA requires medical products to undergo extensive preclinical testing in animals and/or other models to obtain preliminary effectiveness and safety information before they can be tested in human clinical trials. Clinical trials are conducted stepwise: first to prove the product is safe in humans, second to demonstrate the desired effectiveness and optimal dosage (amount to be administered) in a small group human study, and third to demonstrate effectiveness in large, diverse human populations. Each successive phase includes larger numbers of human subjects and requires FDA cognizance prior to proceeding. Work conducted in this PE primarily focuses on late stages of technology maturation activities required to conduct safety and effectiveness clinical trials. Some high-risk technologies may require additional maturation with FDA guidance prior to initiating these clinical trials. Such things as proof of product stability and purity are necessary to meet FDA standards before entering later stages of testing and prior to transitioning into a formal acquisition program where large pivotal trials in diverse populations will be conducted for licensure. Activities in this PE may include completion of preclinical animal studies and small safety and effectiveness studies involving humans according to FDA and EPA requirements. Promising medical technologies that are not regulated by the FDA or EPA are modeled, prototyped, and tested in relevant environments.

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Exhibit R-2, **RDT&E Budget Item Justification:** PB 2024 Army	**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*

Blast research and research into maturing field rations in this PE are fully coordinated with the United States Army Combat Capabilities Development Command Soldier Center. This coordination enables improved body armor design and rations for Soldiers. Additionally, the activities funded in this PE are externally peer reviewed and fully coordinated with all Services as well as other agencies through the Joint Technology Coordinating Groups of the Armed Services Biomedical Research Evaluation and Management (ASBREM) Community of Interest (COI). The ASBREM COI, formed under the authority of the Under Secretary of Defense for Research and Engineering, serves to facilitate coordination and prevent unnecessary duplication of effort within the Department of Defense's biomedical research and development community, as well as its associated enabling research areas.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) Science and Technology (S&T) focus areas and the Army Modernization Strategy.

Work in this PE is performed by: the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Program Change Summary ($ in Millions)

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	137.804	5.207	4.129	-	4.129
Current President's Budget	147.287	31.588	4.147	-	4.147
Total Adjustments	9.483	26.381	0.018	-	0.018
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	26.381			
• Congressional Directed Transfers	-	-			
• Reprogrammings	9.483	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.018	-	0.018

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2022	FY 2023
Project: 814: *NEUROFIBROMATOSIS (CA)*		
Congressional Add: *Neurofibromatosis (CA)*	20.000	-
Congressional Add Subtotals for Project: 814	20.000	-
Project: 945: *BREAST CANCER STAMP PROCEEDS*		
Congressional Add: *Breast Cancer Stamp Proceeds*	0.523	-
Congressional Add Subtotals for Project: 945	0.523	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 97T: *NEUROTOXIN EXPOSURE TREATMENT (CA)*		
Congressional Add: *Peer-reviewed Neurotoxin Exposure Treatment Parkinson's Research*	16.000	-
Congressional Add Subtotals for Project: 97T	16.000	-
Project: MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*		
Congressional Add: *Program Increase: Burn Care Training Curriculum*	5.000	-
Congressional Add: *Program Increase - Peer-Reviewed Military Burn Research*	10.000	-
Congressional Add: *Program Increase - AERIAL RECONFIGURABLE EMBEDDED SYSTEM*	5.000	9.500
Congressional Add: *Dengue Vaccine Development*	6.000	-
Congressional Add: *Hearing Protection for Communications*	5.000	-
Congressional Add: *Heat Stress on Female Service Members*	2.000	-
Congressional Add: *Optimizing Military Health and Performance*	7.000	-
Congressional Add: *Freeze Dried Platelets*	10.000	-
Congressional Add: *Rapid Vaccine Development*	10.000	-
Congressional Add: *Program Increase - SUICIDE PREVENTION WITH FOCUS ON RURAL, REMOTE, ISOLATED, AND OCONUS INSTALLATIONS*	3.000	2.000
Congressional Add: *Trauma Immunology Research*	5.000	-
Congressional Add: *Program Increase - ARMY BATTLEFIELD EXERCISE AND COMBAT RELATED TRAUMATIC BRAIN AND SPINAL CORD INJURY RESEARCH*	-	1.700
Congressional Add: *Program Increase - HEAD SUPPORTED MASS*	-	5.000
Congressional Add: *Program Increase - HEARING PROTECTION FOR COMMUNICATIONS*	-	8.000
Congressional Add: *Program Increase - HEATED GARMENT TESTING EQUIPMENT FOR WARFIGHTERS*	-	0.181
Congressional Add Subtotals for Project: MM2	68.000	26.381
Congressional Add Totals for all Projects	104.523	26.381

Change Summary Explanation
Increased funding due to revised economic assumptions.

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army						**Date:** March 2023						
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*					**Project (Number/Name)** 814 *I NEUROFIBROMATOSIS (CA)*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
814: *NEUROFIBROMATOSIS (CA)*	-	20.000	-	-	-	-	-	-	-	-	0.000	20.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Congressional increase for Neurofibromatosis Research Program.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Neurofibromatosis research.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Neurofibromatosis (CA)	20.000	-
FY 2022 Accomplishments: Program increase supported advanced research on Neurofibromatosis.		
Congressional Adds Subtotals	20.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*					**Project (Number/Name)** 945 *I BREAST CANCER STAMP PROCEEDS*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
945: *BREAST CANCER STAMP PROCEEDS*	-	0.523	-	-	-	-	-	-	-	-	0.000	0.523
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 This Project receives funds as proceeds from the sale of Breast Cancer Stamps.

A. Mission Description and Budget Item Justification
 This Project receives funds as proceeds from the sale of Breast Cancer Stamps.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Breast Cancer Stamp Proceeds	0.523	-
FY 2022 Accomplishments: Breast cancer stamp proceeds.		
Congressional Adds Subtotals	0.523	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army						**Date:** March 2023					
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** 97T *I NEUROTOXIN EXPOSURE TREATMENT (CA)*			

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
97T: *NEUROTOXIN EXPOSURE TREATMENT (CA)*	-	16.000	-	-	-	-	-	-	-	-	0.000	16.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Congressional increase for Peer-Reviewed Neurotoxin Exposure Treatment Parkinson's Research Program.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Neurotoxin Exposure Treatment.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Peer-reviewed Neurotoxin Exposure Treatment Parkinson's Research	16.000	-
FY 2022 Accomplishments: Program Increase supported advanced research on Neurotoxin Exposure Treatment Parkinson's Research.		
Congressional Adds Subtotals	16.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*						**Project (Number/Name)** CJ3 *I Prophylactic for Endemic Diarrheal Diseases*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CJ3: *Prophylactic for Endemic Diarrheal Diseases*	-	3.863	-	-	-	-	-	-	-	-	0.000	3.863
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

Demonstrate bacterial diarrheal prophylactic candidate safety, effectiveness, and pharmacokinetics through clinical trials in humans. Transition the prophylactic candidate to product developer in support of future FDA licensure.

Research is conducted in compliance with the United States Food and Drug Administration (FDA) regulations for medical products for human use.

Research is managed by the United States Army Medical Research and Development Command (USAMRDC) in coordination with the Naval Medical Research Center (NMRC). The Army is responsible for programming and funding all Department of Defense (DoD) naturally occurring infectious disease research requirements, thereby precluding duplication of effort within the Military Departments.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the USAMRDC, Fort Detrick, MD.

Efforts in this Project support the Soldier portfolio and the principal area of Military Relevant Infectious Diseases.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Prophylactic for Endemic Diarrheal Diseases	3.863	-	-
Description: Demonstrate bacterial diarrheal prophylactic candidate safety, effectiveness, and pharmacokinetics through clinical trials in humans in support of future FDA licensure.			
Accomplishments/Planned Programs Subtotals	3.863	-	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** CJ3 *I Prophylactic for Endemic Diarrheal Diseases*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MM2 *I MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	-	68.000	26.381	-	-	-	-	-	-	-	0.000	94.381
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Medical Advanced Technology Initiatives.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Program Increase: Burn Care Training Curriculum	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Burn Care Training Curriculum		
Congressional Add: Program Increase - Peer-Reviewed Military Burn Research	10.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Peer-Reviewed Military Burn Research		
Congressional Add: Program Increase - AERIAL RECONFIGURABLE EMBEDDED SYSTEM	5.000	9.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Aerial Reconfigurable Embedded System		
FY 2023 Plans: Congressional Interest Item funding provided for Aerial Reconfigurable Embedded System		
Congressional Add: Dengue Vaccine Development	6.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Dengue Vaccine Development		
Congressional Add: Hearing Protection for Communications	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Hearing Protection for Communications		
Congressional Add: Heat Stress on Female Service Members	2.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *Medical Advanced Technology*	**Project (Number/Name)** MM2 / *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2022 Accomplishments: Congressional Interest Item funding provided for Heat Stress on Female Service Members		
Congressional Add: Optimizing Military Health and Performance	7.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Optimizing Military Health and Performance		
Congressional Add: Freeze Dried Platelets	10.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Freeze Dried Platelets		
Congressional Add: Rapid Vaccine Development	10.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Rapid Vaccine Development		
Congressional Add: Program Increase - SUICIDE PREVENTION WITH FOCUS ON RURAL, REMOTE, ISOLATED, AND OCONUS INSTALLATIONS	3.000	2.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Suicide Prevention with Focus on Rural, Remote, Isolated, and OCONUS Installations		
FY 2023 Plans: Congressional Interest Item funding provided for SUICIDE PREVENTION WITH FOCUS ON RURAL, REMOTE, ISOLATED, AND OCONUS INSTALLATIONS		
Congressional Add: Trauma Immunology Research	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Trauma Immunology Research		
Congressional Add: Program Increase - ARMY BATTLEFIELD EXERCISE AND COMBAT RELATED TRAUMATIC BRAIN AND SPINAL CORD INJURY RESEARCH	-	1.700
FY 2023 Plans: Congressional Interest Item funding provided for ARMY BATTLEFIELD EXERCISE AND COMBAT RELATED TRAUMATIC BRAIN AND SPINAL CORD INJURY RESEARCH		
Congressional Add: Program Increase - HEAD SUPPORTED MASS	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for Head Supported Mass		
Congressional Add: Program Increase - HEARING PROTECTION FOR COMMUNICATIONS	-	8.000
FY 2023 Plans: Congressional Interest Item funding provided for Hearing Protection for Communications		
Congressional Add: Program Increase - HEATED GARMENT TESTING EQUIPMENT FOR WARFIGHTERS	-	0.181

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MM2 *I MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for Heated Garment Testing Equipment for Warfighters		
Congressional Adds Subtotals	68.000	26.381

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MM7 *I Enabling Med Cap to Support Dispersed OPS Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MM7: *Enabling Med Cap to Support Dispersed OPS Adv Tech*	-	3.120	0.749	0.856	-	0.856	1.036	1.037	1.038	1.049	0.000	8.885
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Matures and demonstrates a tele-monitored and remote-controlled Combat Evacuation Mission Module to support medical resupply and casualty evacuation using future multi-purpose Vertical Take-Off and Landing (VTOL) unmanned aircraft systems (UAS). Provides a self-contained medical module capability adaptable to various future multi- purpose VTOL UAS. Matures and demonstrates an intelligent decision-support capability that can be operated on an Army or Navy provided End User Device (EUD), such as the NETT Warrior system, to assist medics with patient assessment, triage, treatment, and disposition in a Prolonged Field Care (PFC) environment by assessing patient conditions to provide adaptive care guidelines.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Develop Prototype Medical Robotic and Autonomous System (Med-RAS)	3.120	0.722	0.856

Description: Matures and demonstrates a tele-monitored and remote-controlled Combat Evacuation Mission Module to support medical resupply and casualty evacuation using future multi-purpose VTOL UAS. Provides a self-contained medical module capability adaptable to various future multi- purpose VTOL UAS. Matures and demonstrates an intelligent decision-support capability that can be operated on an Army or Navy provided EUD, such as the NETT Warrior system, to assist medics with patient assessment, triage, treatment, and disposition in a PFC environment by assessing patient conditions to provide adaptive care guidelines.

FY 2023 Plans:
Mature the combat evacuation mission module (CEMM) and conceptual designs and physical prototypes of the Multi-Mission Vehicle Interface (MMVI); demonstration the MMVI prototype with the Future Vertical Lift prototype or technology demonstrator vehicle or an "optionally-manned" aircraft and /or Squad Multi-purpose Equipment Transport unmanned ground vehicle.

FY 2024 Plans:
Will continue work to mature the Combat Evacuation Mission Module (CEMM) and conceptual designs and physical prototypes of the Multi-Mission Vehicle Interface (MMVI). Will demonstrate the technology and advance the communication infrastructure towards optimal multipurpose system.

FY 2023 to FY 2024 Increase/Decrease Statement:

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MM7 *I Enabling Med Cap to Support Dispersed OPS Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.027	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638.			
Accomplishments/Planned Programs Subtotals	3.120	0.749	0.856

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technology					Project (Number/Name) MN3 / Immediate Cardiopulmonary Stabilization Adv Tech			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MN3: *Immediate Cardiopulmonary Stabilization Adv Tech*	-	1.702	-	-	-	-	-	-	-	-	0.000	1.702
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project covers development, pre-clinical and early-clinical demonstration, and transition of technologies for immediate pre-hospital hemorrhage detection and control and airway management. These technologies facilitate autonomous intubation and airway management in combat casualties with obstructed airways. This Project also demonstrates advanced technologies for use in forward areas to detect and control non-compressible internal bleeding, and demonstration of pain-relieving drugs that are safe for use during bleeding.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Tactical Combat Casualty Care Pharmaceuticals and Devices Cap Set 1	1.702	-	-
Description: Development, late-phase animal studies and early-clinical demonstration, and transition of technologies that facilitate autonomous intubation and airway management in combat casualties with obstructed airways, as well as advanced hemostatic (arrest of bleeding) bandage candidates that correct the patient's blood clotting system and new tourniquet technologies suitable for prolonged use.			
Accomplishments/Planned Programs Subtotals	1.702	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *Medical Advanced Technology*	**Project (Number/Name)** MN3 / *Immediate Cardiopulmonary Stabilization Adv Tech*

D. Acquisition Strategy

  N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MN4 *I Advanced Life Support Advanced Technology*			

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MN4: *Advanced Life Support Advanced Technology*	-	3.797	-	-	-	-	-	-	-	-	0.000	3.797
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project covers development, demonstration, and transition of technologies that enable advanced life support under prolonged care scenarios, including life-support devices that provide lung and kidney functions in casualties with severe injuries and devices and clinical guidelines for the prevention of irreversible organ damage resulting from prolonged lack of blood circulation.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Battlefield Sustainment of Critical Organ Function Capability Set 1 *Description:* Develop, demonstrate and transition technologies that enable advanced life support under prolonged field care scenarios: life-support devices that provide lung and kidney functions in casualties with severe injuries, and devices and clinical guidelines for the prevention of irreversible organ damage resulting from prolonged lack of blood circulation.	3.797	-	-
Accomplishments/Planned Programs Subtotals	3.797	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MN4 *I Advanced Life Support Advanced Technology*

D. Acquisition Strategy
  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603002A I *Medical Advanced Technology*				Project (Number/Name) MN5 I *Next Generation Blood Products Advanced Technology*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MN5: *Next Generation Blood Products Advanced Technology*	-	9.275	-	-	-	-	-	-	-	-	0.000	9.275
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project covers technology development, pre-clinical and early-clinical demonstration, and transition of new blood products with increased shelf life and functionality. Cold-stored platelets, fibrinogen replacement technologies, and pharmaceuticals that protect and metabolically stabilize blood-deprived tissues and reverse impaired blood clotting subsequent to severe injury, will improve prompt hemorrhage control, mitigate effects of shock, and minimize sustainment requirements.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: Next Generation Human-Derived Blood Replacement *Description:* Develop, demonstrate in pre-clinical and early-clinical studies, and transition new blood products with increased shelf life and functionality including cold-stored platelets and biopharmaceutical technologies that stop life threatening bleeding, stabilize tissue metabolism, mitigate shock and restore normal blood clotting will improve prompt hemorrhage control and minimize sustainment requirements.	9.275	-	-
Accomplishments/Planned Programs Subtotals	9.275	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MN5 *I Next Generation Blood Products Advanced Technology*

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MN6 *I Blast & Head Impact Exposure Monitor Advanced Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MN6: *Blast & Head Impact Exposure Monitor Advanced Tech*	-	1.490	1.168	-	-	-	-	-	-	-	0.000	2.658
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will inform the development of technologies and strategies to detect and provide actionable information to unit leader/Soldier about hazardous exposure to blast and head impact. This capability will help prevent degradation to Soldier cognitive readiness and performance and enhance combat power.

The cited research is fully coordinated with Program Element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology) and is fully coordinated with other Services in order to avoid duplication of effort.

The cited work is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Injury Criteria for Informing the Development of New Tactical Head borne Systems.	1.490	1.125	-
Description: This effort validates injury risk assessment/guidance/criteria that will inform the development of technologies (i.e., personal protection equipment, vehicles) and strategies (i.e., health hazard assessments) to protect the Soldier against current and emerging operational threats (i.e., blast, blunt, ballistic, and accelerative). **FY 2023 Plans:** Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in National Defense Authorization Act 2019 (Sections 711,737). Funding transferred to Program Element 0603115DHA, Project Code 373H. **FY 2023 to FY 2024 Increase/Decrease Statement:** Decrease due to completion of work and delivery of transition in this project.			
Title: SBIR/STTR Transfer **FY 2023 Plans:**	-	0.043	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MN6 *I Blast & Head Impact Exposure Monitor Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638.			
Accomplishments/Planned Programs Subtotals	1.490	1.168	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*			**Project (Number/Name)** MN7 *I Musculoskeletal Injury Screening Tool Adv Tech*				
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MN7: *Musculoskeletal Injury Screening Tool Adv Tech*	-	1.604	1.276	0.762	-	0.762	0.827	0.484	0.485	0.490	0.000	5.928
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops strategies and technologies to reduce musculoskeletal injury (MSKI) rates and improve outcomes following Return to Duty (RTD) in the Army training, operational, and medical communities to improve Soldier readiness.

The cited research is fully coordinated with Program Element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology), and is fully coordinated with the Army Training and Doctrine Command (TRADOC) and other Services in order to avoid duplication of effort.

The cited work is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Leader and Medical Provider Tools to Prevent and Reduce Musculoskeletal Injury in All Settings	1.029	1.229	0.762
Description: Project validates in field environment strategies and technologies to reduce MSKI rates and improve outcomes following RTD in the Army training, operational, and medical communities to improve Soldier readiness. *FY 2023 Plans:* Will validate and transition musculoskeletal injury risk guidelines to TRADOC-CIMT, complementary applied research efforts will be performed in Program Element 0602787A, Project MK4 (Leader Tools to Reduce Musculoskeletal Injury in All Settings). *FY 2024 Plans:* Will validate and transition next generation capabilities in musculoskeletal injury risk and performance degrading prediction tools. *FY 2023 to FY 2024 Increase/Decrease Statement:* Decreased funding due to completion of studies related to reduction of stress fracture during basic training. Funding change reflects planned lifecycle of this effort.			
Title: Forward Neuro-Muscular Skeletal Injury Assessment to Reduce Unnecessary Evacuations	0.575	-	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MN7 *I Musculoskeletal Injury Screening Tool Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This program will validate solutions to accurately assess the severity of acute, non-penetrating soft-tissue injuries in training and operational environments. This capability once transitioned will show proof of concept of a capability that will improve Soldier readiness and return to duty and limit unnecessary evacuations by accurately diagnosing and assessing musculoskeletal injury.			
Title: SBIR/STTR Transfer *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638.	-	0.047	-
Accomplishments/Planned Programs Subtotals	1.604	1.276	0.762

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

PE 0603002A: *Medical Advanced Technology*
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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603002A / *Medical Advanced Technology*				**Project (Number/Name)** MN9 / *Far Forward Behavioral Health Care Advanced Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MN9: *Far Forward Behavioral Health Care Advanced Tech*	-	0.273	-	-	-	-	-	-	-	-	0.000	0.273
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will deliver a tested delivery system for behavioral health interventions oriented to far forward settings that will ensure the psychological readiness of Soldiers and safeguard their far forward readiness and performance in austere operating environments, under high intensity operational stressors.

The cited research is fully coordinated with Program Element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology), and is fully coordinated with other Services in order to avoid duplication of effort.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Far Forward Behavioral Health Care	0.273	-	-
Description: This effort will deliver a tested delivery system for behavioral health interventions oriented to far-forward settings that will ensure the psychological readiness of Soldiers and safeguard their far-forward readiness and performance in austere operating environments, under high intensity operational stressors.			
Accomplishments/Planned Programs Subtotals	0.273	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army												**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3					**R-1 Program Element (Number/Name)** PE 0603002A / *Medical Advanced Technology*					**Project (Number/Name)** MO2 / *Traumatic Brain Injury (TBI) Treatment Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MO2: *Traumatic Brain Injury (TBI) Treatment Adv Tech*	-	10.418	-	-	-	-	-	-	-	-	0.000	10.418
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

This Project covers development, demonstration, transition of technologies for acute battlefield management of brain trauma, and maintains laboratory capability to perform these functions. Efforts include pre-clinical demonstration of drug therapy and resuscitation strategies for treatment of acute brain injury in the pre-hospital setting, biomarkers, diagnostics, and devices, as well as novel drug delivery technologies to facilitate administration of pharmaceuticals at or near the point of injury to protect the injured brain from further damage.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Drugs to Prevent and Treat Brain Injury (TBI)	10.418	-	-
Description: Develop, demonstrate, and transition technologies to treat combat-related brain injury. Technologies include drugs administered at or near the point of injury to treat combat-related brain injury while also stabilizing and protecting non-injured brain tissues, and novel drug delivery platforms that specifically target injured brain cells.			
Accomplishments/Planned Programs Subtotals	10.418	-	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MO2 *I Traumatic Brain Injury (TBI) Treatment Adv Tech*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

PE 0603002A: *Medical Advanced Technology*
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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MO4 *I Burn Recovery Optimization Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MO4: *Burn Recovery Optimization Advanced Technology*	-	2.035	-	-	-	-	-	-	-	-	0.000	2.035
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

This Project covers technology development, demonstration, and transition of burn recovery optimization technologies, including diagnostic technology to predict skin graft success or failure, technologies to measure and predict burn wound healing rate and assess burn treatment effectiveness, and novel dressings that protect severe burn wounds from further injury and prevent inflammation and infection until definitive surgical burn care is available.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Rapid Burn Injury Treatment and Return to Duty Capability Set 1	2.035	-	-
Description: Mature, demonstrate, and transition burn recovery optimization technologies. These include diagnostic technology to predict skin graft success or failure, and advanced dressings that contain anti-infective and anti-inflammatory agents for prehospital use to protect severe burn wounds from further injury, infection and inflammation for prolonged periods until definitive surgical wound care is provided.			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MO4 *I Burn Recovery Optimization Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Accomplishments/Planned Programs Subtotals	2.035	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603002A I *Medical Advanced Technology*					**Project (Number/Name)** MO7 I *Improved Bone Repair Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
MO7: *Improved Bone Repair Advanced Technology*	-	1.050	-	-	-	-	-	-	-	-	0.000	1.050
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

This Project matures, demonstrates, and validates promising medical technologies and new clinical practices to improve outcomes following severe limb injuries involving complex bone fractures and injured surrounding soft tissues.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology), Project MM4 (Cbt Casualty Care Applied Rsch Technology), are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development), Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Field Stabilization of Bone in Preparation for Evac	0.554	-	-
Description: Maturation, demonstration, and transition of technologies that improve outcomes, mobility, and return to duty following severe limb injuries involving complex bone fractures and injured soft tissues in casualties treated under multi-domain operations conditions.			
Title: Limb Function Repair and Return to Combat Duty	0.496	-	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MO7 *I Improved Bone Repair Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Maturation, demonstration, and transition of technologies that improve outcomes, and return to duty following severe limb injuries involving complex bone fractures and injured soft tissues.			
Accomplishments/Planned Programs Subtotals	1.050	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MO8 *I Expeditionary Performance Nutrition Advanced Techn*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MO8: *Expeditionary Performance Nutrition Advanced Techn*	-	1.929	0.175	0.731	-	0.731	0.164	0.164	0.164	0.166	0.000	3.493
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project covers the development of real-time, specific, and individualized interventions to optimize mental acuity and fatigue and manage metabolic and nutritional needs to sustain Soldier physical, mental, and immunological performance.

The cited research is fully coordinated with Program element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology), and is fully coordinated with other Services in order to avoid duplication of effort.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Medical Strategies to Sustain Soldier Alertness and Performance in All Settings	1.929	0.169	0.731
Description: Develop real-time, specific, and individualized interventions to optimize mental acuity and fatigue and manage metabolic and nutritional needs to sustain Soldier physical, mental, and immunological performance.			
FY 2023 Plans: Develop evidence-based recommendations for nutritional interventions in Soldiers undergoing strenuous, high OPTEMPO, dispersed and disaggregated operations to reduce physical, cognitive and psychological degradation and provide overmatch capability.			
FY 2024 Plans: Develop and manage metabolic and nutritional needs to sustain Soldier physical, mental, and immunological performance in response to all Settings.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MO8 *I Expeditionary Performance Nutrition Advanced Techn*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.006	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638.			
Accomplishments/Planned Programs Subtotals	1.929	0.175	0.731

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*				**Project (Number/Name)** MP3 *I Phys Chem Toxicity Assessment Sys Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MP3: *Phys Chem Toxicity Assessment Sys Adv Tech*	-	2.208	1.839	1.798	-	1.798	1.079	0.357	0.357	0.361	0.000	7.999
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project covers the development of products and solutions that will protect and prevent degradation of Soldier health, readiness and performance from environmental stressors (heat, cold, altitude, and chemical toxicants) while conducting prolonged operations in Multi-Domain Operations (MDO). Develop algorithms and physiological models to inform unit leaders and Soldiers and provide actionable information and interventions to manage metabolic needs, maintain performance, and avoid non-battle injuries while operating in extreme environments.

This Project contains no duplication with any effort within the Military Departments and includes direct participation by other Services. The cited research is fully coordinated with Program Element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology).

The cited research is consistent with the Under Secretary of Defense, Research and Engineering Science and Technology, focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Solutions to Sustain Warfighter Performance in Extreme Environments *Description:* Protect and prevent degradation of Soldier health, readiness and performance from environmental stressors (heat, cold, altitude, chemical toxicants) while conducting prolonged operations in the MDO. Develop algorithms and physiological models to inform unit leaders and Soldiers and provide actionable information and interventions to manage metabolic needs, maintain performance, and avoid non-battle injuries while operating in extreme environments. *FY 2023 Plans:* Will provide validated tools to sustain lethality and optimize performance and to prevent injuries related to multi-environmental stressors; optimize capability to improve performance and thermal comfort in hot environments using innovative cooling technology; deliver to advanced development mature and validated algorithms for exertional heat injury, acute mountain sickness, and cold-weather clothing selection; begin validation of method for cold habituation to improve cold tolerance and comfort and	2.208	1.772	1.798

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603002A *I Medical Advanced Technology*	**Project (Number/Name)** MP3 *I Phys Chem Toxicity Assessment Sys Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
reduce frostbite when operating in arctic conditions; and conduct field validation and acceptability of novel physiological status monitoring (PSM) compression shirts. ***FY 2024 Plans:*** Will provide validated tools to sustain lethality and optimize performance and to prevent injuries related to multi-environmental stressors; complete validation of method for cold habituation to improve cold tolerance and comfort and reduce frostbite when operating in arctic conditions; and conduct field validation and acceptability of novel physiological status monitoring (PSM) compression shirts. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned life cycle of this effort.			
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638.	-	0.067	-
Accomplishments/Planned Programs Subtotals	2.208	1.839	1.798

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											Date: March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603007A *I Manpower, Personnel and Training Advanced Technology*							

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	13.865	15.598	16.316	-	16.316	18.084	17.136	17.163	17.367	0.000	115.529
792: *Personnel Performance & Training*	-	13.865	15.598	16.316	-	16.316	18.084	17.136	17.163	17.367	0.000	115.529

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and validates applied behavioral and social science technologies that enhance the Soldier Lifecycle (e.g., selection, assignment, training, leader development) and human relations (e.g. unit cohesion). These technologies provide advanced personnel measures that more fully assess potential and predict performance, behavior, attitudes, and resilience. These technologies also provide innovative and effective Talent Management methods to optimize individual and team performance to ensure the Army can meet mission requirements in uncertain and complex environments. This PE evaluates new selection measures, assignment methods, and performance metrics for individuals and units, assesses innovative training methods, and conducts scientific assessments to inform Human Capital policy and programs. Work in this PE will result in effective non-materiel solutions to help the Army adjust to changes in force size and structure, a variety of mission demands and contexts, challenges in human relations, and budgetary constraints.

Work in this PE complements and is fully coordinated with PE 0602785A (Manpower/Personnel/Training Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Vision, the Army's Talent Management Strategy, and the Army Modernization Strategy

Work in this PE is performed by the United States Army Research Institute (ARI) for the Behavioral and Social Sciences in Ft. Belvoir, VA.

B. Program Change Summary ($ in Millions)

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	14.273	15.598	16.514	-	16.514
Current President's Budget	13.865	15.598	16.316	-	16.316
Total Adjustments	-0.408	0.000	-0.198	-	-0.198
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.408	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.198	-	-0.198

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603007A *I Manpower, Personnel and Training Advanced Technology*

Change Summary Explanation
Decreased funding to support higher Army priorities.

PE 0603007A: *Manpower, Personnel and Training Advance...*
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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603007A / Manpower, Personnel and Training Advanced Technology						**Project (Number/Name)** 792 / Personnel Performance & Training		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
792: *Personnel Performance & Training*	-	13.865	15.598	16.316	-	16.316	18.084	17.136	17.163	17.367	0.000	115.529
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrate applied behavioral and social science technologies that enhance the Soldier Lifecycle (e.g., selection, assignment, training, leader development) and human relations (e.g., unit cohesion). These technologies provide advanced personnel measures that more fully assess potential and predict performance, behavior, attitudes, and resilience. These technologies also provide innovative and effective Talent Management methods to optimize individual and team performance to ensure the Army can meet mission requirements in uncertain and complex environments. This demonstrates new selection measures, assignment methods, and performance metrics for individuals and units; assesses innovative leader development and learning methods, and conducts scientific assessments to inform Human Capital policy and programs. Research will result in effective non-materiel solutions to help the Army adjust to changes in force size and structure, a variety of mission demands and contexts, challenges in human relations, and budgetary constraints.

Work in this Project complements PE 0602785A (Personnel Performance & Training Technology)

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology priority focus areas, the Army Vision, the Army People Strategy, the Army's Talent Management Strategy, and the Army Modernization Strategy.

Work is performed by the United States Army Research Institute (ARI) for the Behavioral and Social Sciences in Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Talent Assessment and Development *Description:* This effort optimizes and demonstrates innovative talent management approaches to provide the Army the flexibility to adapt to changes in force structure and recruiting environments. This effort matures Soldier selection measures, techniques, and tools to more fully assess Soldier potential and better predict behavior, attrition, Soldier performance, and team effectiveness. This effort also matures and demonstrates methods that develop and model Soldier talents/competencies longitudinally across a career. ***FY 2023 Plans:***	13.865	15.146	16.316

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603007A *I Manpower, Personnel and Training Advanced Technology*	**Project (Number/Name)** 792 *I Personnel Performance & Training*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will mature prototype assessment batteries to improve integrated personnel assessments for Officer selection and assignment; mature and validate augmented assessment prototypes designed to automatically generate personnel assessment content; validate leader development methods for junior NCOs; optimize small unit performance measurement tools. *FY 2024 Plans:* Will initiate prototype development of officer talent management assessments; will continue to validate augmented assessment prototypes designed to automatically generate personnel assessment content; will mature research on methods to develop complex leader competencies by conducting field validations of the transfer of knowledge to performance environments; will continue to develop small unit performance measurement tools. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase supports planned lifecycle of the effort.			
Title: SBIR/STTR Transfer *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.452	-
Accomplishments/Planned Programs Subtotals	13.865	15.598	16.316

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

PE 0603007A: *Manpower, Personnel and Training Advance...*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*						**R-1 Program Element (Number/Name)** PE 0603025A *I Army Agile Innovation and Demonstration*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	21.420	20.900	23.156	-	23.156	24.242	28.558	31.989	33.447	0.000	183.712
CK8: *Advanced Technology Development and Convergence*	-	21.420	15.200	15.319	-	15.319	15.358	16.372	16.433	16.612	0.000	116.714
DA3: *Army Advanced Innovation*	-	-	5.700	7.837	-	7.837	8.884	12.186	15.556	16.835	0.000	66.998

A. Mission Description and Budget Item Justification

This Program Element (PE) funds the Army's goal of accelerating innovative solutions to achieve future force modernization. The Army is developing new ways of doing business to include strategic and "non-traditional" partnerships, and working with traditional vendors in novel ways to allow for agile integration of leading-edge technology. Critical technologies that allow for technological superiority are increasingly dual-use or developed in academia-led partnerships that leverage cutting edge innovation. In an era of global competition, technological superiority requires agile and rapid innovation. Cross-cutting modernization initiatives leveraging strategic partnerships foster an environment to bring knowledge and expertise to demonstrate breakthrough and innovative technologies that will benefit the warfighter. These collaborations bring new ways of doing business to demonstrate emerging technologies and systems with high payoff potential to address current technology shortfalls or future capability gaps and systems. This PE will also allow for exploration and adaptation of various technologies in the early stages of development, enabling cost saving decisions early in the procurement life-cycle by using the try, buy, decide model of identifying and investing in proof of technology demonstrations that the army can adapt and integrate. Leveraging other innovative mechanisms, to include accelerators, incubators, and other technology accelerants, to enhance innovation is part of the overall innovation strategy. Innovation includes not only hardware, and physical products but also software, software development, artificial intelligence (AI) and machine learning, all as stand-alone initiatives and as part of broader innovation to programs and technology development. Oversight includes a joint Innovation governance process which requires joint evaluation of programs that will meet the the basis of Army Priorities and Army Modernization needs to inform an optimal technology investment strategy.

Research in this PE is closely coordinated with PE 0602002A (Army Agile Innovation and Development-Applied Research)

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Priority focus areas and the Army Modernization Strategy.

Research is performed by the United States Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603025A *I Army Agile Innovation and Demonstration*		

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	22.231	20.900	23.055	-	23.055
Current President's Budget	21.420	20.900	23.156	-	23.156
Total Adjustments	-0.811	0.000	0.101	-	0.101
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.811	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.101	-	0.101

Change Summary Explanation

Increased funding due to revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603025A / Army Agile Innovation and Demonstration				**Project (Number/Name)** CK8 / Advanced Technology Development and Convergence			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CK8: *Advanced Technology Development and Convergence*	-	21.420	15.200	15.319	-	15.319	15.358	16.372	16.433	16.612	0.000	116.714
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project aims to accelerate the Army's goal of finding innovative and nontraditional solutions to the most difficult technological problems. Efforts to pair with nontraditional entities, such as industry, to rapidly solve System and Sub-System Component and Prototype Convergence by merging smaller subsystems towards a more complex solution and integrating one or more technologies to prove out concepts. Efforts for the Army Futures Command Software Factory, leverage Soldiers to develop software that will be used closer to the tactical edge. Soldiers adopt an Agile Development Process to rapidly mature experimental software for mobile technology, secure authentication procedures, and other software needs for Army-specific hardware platforms. This will bring new ways of doing business to demonstrate emerging technologies and systems with high payoff potential to address current technology shortfalls or future capability gaps and systems.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project supports all Army Modernization Priorities.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Advanced Technology Development of Existing Commercial Technology *Description:* Advanced commercial development exists when direct investment leads to rapid technology applications and demonstration. The Army identifies existing technology to further develop and modify for Army use. Partnerships with industry both traditional and non-traditional, allow the Army to advance non-military commercial research and development investments through focused engagements resulting in commercial adaption and integration to address Army technology and modernization efforts. Initial nominal Army investment in proof of technology and technology demonstrations will expedite novel technologies shaping their development to meet Army requirements and expediting both component and complete system adaptation and integration. *FY 2023 Plans:* The Army enterprise will identify commercial solutions to technology problem areas focused on next generation combat vehicles, dismounted soldier lethality, power generation and storage, infrastructure to enable power generation, data driven human	5.781	9.923	10.226

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603025A / *Army Agile Innovation and Demonstration*	**Project (Number/Name)** CK8 / *Advanced Technology Development and Convergence*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
performance and Soldier readiness, AI and robotic enabled small units, network and satellite support, and novel sensors and technologies. *FY 2024 Plans:* Address operational challenges that enable the Army to conduct operations in contested environments, which will enable our ability to prevail on the future battlefield. These include, but are not limited to emerging and commercially available technology that enhances next generation combat vehicles, dismounted soldier lethality, power generation and storage, logistics, data driven human performance and soldier readiness, AI and robotic enabled small units, and network and satellite support. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase supports the planned lifecycle of the effort.			
Title: Sub-System Component and Prototype Convergence *Description:* The Army investigates, develops, and integrates non-traditional cutting-edge technology. Sub-system component and prototype convergence seeks to develop or integrate one or more technologies to prove out concepts or to merge smaller subsystems towards a more complex solution. This task informs requirements developers where the state of technologies is at, where it is going and on what timeline confirming viability for incorporation into larger technology programs.	3.854	-	-
Title: Experimentation and Development of Commercial Dual Use Technologies *Description:* The Army seeks to connect with industry early in a technology's commercialization process. Experimentation and development will connect with these non-traditional technologies to determine the feasibility and ability to be leveraged against military applications. Technology development will be conducted concurrently to commercial activities with experimentation used to understand proof-of-concept applicability for further Government initiative. As part of this process strategic partnerships will be cultivated with technology aggregators such as In-Q-Tel to ensure a comprehensive approach to connect and transition technologies to the Army.	4.007	-	-
Title: Software Factory Advanced Software Development *Description:* As part of the novel Software Factory stood up by Army Futures Command (AFC), Soldiers will be leveraged to address some of the most challenging software research problems that the Army faces. Soldiers will adopt an Agile Development Process to rapidly mature experimental software for mobile technology, secure authentication procedures, and other software needs for Army-specific hardware platforms.	4.721	-	-
Title: Demonstration and Development of Army Discovered Innovative Technologies *Description:* The Army seeks to develop and demonstrate technology that display unique and innovative potential in a cross-domain fashion. This effort seeks to direct advanced research funding towards technologies that are discovered from Army	3.057	4.722	5.093

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603025A I *Army Agile Innovation and Demonstration*	**Project (Number/Name)** CK8 I *Advanced Technology Development and Convergence*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Innovation events such as Innovation Days funded by PE 0605054A (Emerging Technology Initiatives) / Project FI3 (Rapid Capability Development and Maturation) or the Expeditionary Technology Search effort in PE 0605803A (Technical Information Activities) / Project CC2 (Expeditionary Technologies). *FY 2023 Plans:* Will develop and demonstrate unique solutions to Army wide problems leveraging technology discovered through Army technology search events. *FY 2024 Plans:* Will develop and demonstrate unique solutions to Army wide problems leveraging technology discovered through Army technology search events. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase supports the planned lifecycle of the effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.555	-
Accomplishments/Planned Programs Subtotals	21.420	15.200	15.319

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603025A *I Army Agile Innovation and Demonstration*					**Project (Number/Name)** DA3 *I Army Advanced Innovation*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
DA3: *Army Advanced Innovation*	-	-	5.700	7.837	-	7.837	8.884	12.186	15.556	16.835	0.000	66.998
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds the Advanced Development portion of the Army Innovation Plan, the Army's investment strategy to rapidly accelerate innovative solutions to challenging Warfighter problems. This Project will provide the Army with the most advanced and cutting-edge solutions with the ability to adapt and integrate multi-disciplinary innovative technologies by bridging the interfaces between internal and external efforts for a holistic entry into the acquisition pipeline at the most appropriate milestone. This Project also seeks to further develop and demonstrate these technologies in support of cross-domain operations, with emphasis on open/modular systems architecture and digital thread/engineering, and provide a pathway for entry into the acquisition process.

This Project is coordinated with PE 0602002A (Army Agile Innovation and Development-Applied Research) / Project DC4 (Army Applied Innovation).

Army Senior Leadership approves Army innovation projects prior to budget year programming based on priority, opportunity, and return on investment for the American taxpayer- ensuring that innovations have a high potential for filling capability gaps and transitioning.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project supports all Army Modernization Priorities.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	**FY 2023**	**FY 2024**
Title: Army Advanced Innovation	-	5.492	7.837
Description: The Army seeks to develop and demonstrate technology that display unique and innovative potential in a cross-domain fashion. This effort will serve as funding to rapidly transition disruptive and groundbreaking capabilities that fall outside of the normal acquisition pipeline.			
FY 2023 Plans: Initiate a competitive process that selects technologies with a high promise of advancing and accelerating capabilities to be investigated in open systems and digital engineering architectures, prior to be transitioned either to further Science and Technology efforts, or Research Development Testing & Evaluation (RDTE) Budget Activity (BA) 6.4 funding, depending on the technology readiness level (TRL) at the end of the effort. The Army Innovation Program will accept multiple new efforts			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603025A / *Army Agile Innovation and Demonstration*	**Project (Number/Name)** DA3 / *Army Advanced Innovation*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
that support Army Modernization, to include cyber, Electronic Warfare, Sensors, Power and Energy, Artificial Intelligence and Autonomy, Communications, Position, Navigation and Timing, advancing Synthetic Training Environments; and Air and Ground Platform integration. *FY 2024 Plans:* Assess, seed, demonstrate, integrate and bridge technologies from experimentation demonstrations which will allow for rapid transitions that meet persistent modernization requirements. The Army Innovation Program will accelerate multiple efforts to include cyber, Electronic Warfare, Sensors, Power and Energy, Artificial Intelligence and Autonomy, Communications, Position, Navigation and Timing, advancing Synthetic Training Environments; and Air and Ground Platform integration, Long Range Precision Fires, and Air and Missile Defense *FY 2023 to FY 2024 Increase/Decrease Statement:* Increase in program to consolidate innovation program focused on foundational network to a broader innovation program focused on transitions that support multiple technologies areas supporting modernization			
Title: SBIR/STTR *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.208	-
Accomplishments/Planned Programs Subtotals	-	5.700	7.837

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*						R-1 Program Element (Number/Name) PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	0.876	6.395	13.187	-	13.187	14.412	14.130	14.732	16.504	0.000	80.236
CL1: *AI Enhanced Intel Operations Advanced Technologies*	-	0.357	1.424	1.359	-	1.359	2.269	2.174	2.216	4.033	0.000	13.832
CL6: *ATR Using Multiple Cooperative Sensors Adv Tech*	-	0.519	1.883	4.909	-	4.909	6.857	6.721	6.793	6.880	0.000	34.562
CN6: *Predictive Maintenance Advanced Technology*	-	-	2.311	4.117	-	4.117	4.131	4.078	4.062	4.177	0.000	22.876
DA7: *AI-Enabled Command and Coordination Adv Tech*	-	-	0.777	1.396	-	1.396	1.155	1.157	1.661	1.414	0.000	7.560
DE9: *AI Development Environment Advanced Technology*	-	-	-	1.406	-	1.406	-	-	-	-	0.000	1.406

A. Mission Description and Budget Item Justification

This Program Element (PE) will mature and demonstrate advanced technologies using artificial intelligence (AI) and machine learning (ML) to improve target recognition/detection using multiple cooperative autonomous sensors, leader decision-making, and replication of tactical behaviors to enable autonomous capabilities for maneuver, predictive maintenance, talent management, Intel support for Operations, network and cybersecurity and medical support. The Army's Artificial Intelligence Integration Center (AI2C) will provide strategic guidance and coordination of these advanced research efforts in AI/ML across the Army Modernization enterprise.

Research in this PE contributes to the Army Science and Technology (S&T) portfolio and is fully coordinated with efforts in PE 0601601A (Artificial Intelligence Basic Research) and PE 0602180A (Artificial Intelligence Technologies).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas, the Army Modernization Strategy and the Chief Digital and Artificial Intelligence Office (CDAO).

Research in this PE is performed by the United States Army Futures Command (AFC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army				**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*		
B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	0.909	6.395	7.759	-	7.759
Current President's Budget	0.876	6.395	13.187	-	13.187
Total Adjustments	-0.033	0.000	5.428	-	5.428
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.033	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	5.428	-	5.428

Change Summary Explanation

Increased funding to support higher priority efforts within the Science & Technology (S&T) portfolio and Artificial Intelligence development efforts.

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*				**Project (Number/Name)** CL1 *I AI Enhanced Intel Operations Advanced Technologies*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CL1: *AI Enhanced Intel Operations Advanced Technologies*	-	0.357	1.424	1.359	-	1.359	2.269	2.174	2.216	4.033	0.000	13.832
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

AI Enabled Intelligence Fusion for Targeting will address a "multi-INT" fusion problem and mature and demonstrate how AI algorithms can fuse data from various military intelligence systems to support sensor to shooter automation for the strategic, operational, and tactical levels. This effort will design and develop AI capabilities for support of Long Range Precision Fires, Mission Command, and Maneuver Commanders by leveraging Intelligence Community enterprise investments in sensing, data transport, and Machine Learning / AI frameworks.

Research in this Project supports the Army Science and Technology Lethality Portfolio and the Chief Digital and Artificial Intelligence Office (CDAO).

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: AI Enhancements for Prometheus	0.357	0.570	-
Description: AI Enabled Intelligence Fusion for Targeting will mature and demonstrate how AI algorithms can fuse data from various military intelligence systems (multi-INT) to support sensor to shooter automation for the strategic, operational, and tactical levels. This effort will design and develop AI capabilities for support of Long Range Precision Fires, Mission Command, and Maneuver Commanders by leveraging Intelligence Community enterprise investments in sensing, data transport, and Machine Learning / AI frameworks. ***FY 2023 Plans:*** Will demonstrate that the algorithms matured on this project can generate artificial data, and that this artificial data is realistic enough to train an AI system in place of real data. Will validate the full methodology on a military-related problem where the system will generate artificial data and use that artificial data to re-train a military AI-system like Prometheus. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease represents realignment to task AI Enabled Intelligence Fusion for Targeting.			
Title: Intelligence Fusion for Targeting	-	0.802	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CL1 *I AI Enhanced Intel Operations Advanced Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: AI Enabled Intelligence Fusion for Targeting will optimize AI algorithms and demonstrate howthey can fuse data from various military intelligence systems (multi-INT) to support sensor to shooter automation for the strategic, operational, and tactical levels. This effort will design and develop AI capabilities for support of Long Range Precision Fires, Mission Command, and Maneuver Commanders by leveraging Intelligence Community enterprise investments in sensing, data transport, and Machine Learning / AI frameworks. *FY 2023 Plans:* Will demonstrate the ability of the algorithm to fuse data from various military intelligence systems (ARCANE series, Prometheus, and ATR-MCAS) in a simulated test. Will then demonstrate the algorithm performing fusion of real-world intelligence data to show improved target confirmation over what can be provided by any single AI-enabled sensor. Will work with product owners of TITAN and SHOT systems to exploit the fusion algorithm and the required data pipelines. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease represents realignment to task AI Enabled Intelligence Fusion for Targeting.			
Title: SBIR/STTR Transfer	-	0.052	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: AI Enabled Intelligence Fusion for Targeting	-	-	1.359
Description: AI Enabled Intelligence Fusion for Targeting will mature and demonstrate how AI algorithms can fuse data from various military intelligence systems (multi-INT) to support sensor to shooter automation for the strategic, operational, and tactical levels. This effort will design and develop AI capabilities for support of Long Range Precision Fires, Mission Command, and Maneuver Commanders by leveraging Intelligence Community enterprise investments in sensing, data transport, and Machine Learning / AI frameworks. *FY 2024 Plans:* AI Enabled Intelligence Fusion for Targeting will provide a system of applications to identify targets of interest. This effort will mature algorithms to predict representation of novel object classes from a small number of novel class samples, improving the AI algorithm learning capability and reducing the need for manual data input. Will investigate the use of visual, language, signal, and event-based information and semantic relationships to learn new objects and relationships and validate knowledge transfer from base classes to novel classes in order to reduce the time it takes to train AI algorithms. Will demonstrate the ability			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CL1 *I AI Enhanced Intel Operations Advanced Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
of the algorithm to fuse data from various military intelligence systems in a simulated test. Will then demonstrate the algorithm performing fusion of real-world intelligence data to show improved target confirmation over what can be provided by any single AI-enabled sensor. Will work with product owners of TITAN and SHOT systems to exploit the fusion algorithm and the required data pipelines. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 funding increase represents realignment from tasks AI Enhancement for Prometheus and Intelligence Fusion for Targeting to expand the use of AI and ML to demonstrate multi-INT data fusion.			
Accomplishments/Planned Programs Subtotals	0.357	1.424	1.359

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army									Date: March 2023	

| Appropriation/Budget Activity
2040 I 3 | | | | R-1 Program Element (Number/Name)
PE 0603040A I *Artificial Intelligence and Machine Learning Advanced Technologies* | | | | | Project (Number/Name)
CL6 I *ATR Using Multiple Cooperative Sensors Adv Tech* | |

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CL6: *ATR Using Multiple Cooperative Sensors Adv Tech*	-	0.519	1.883	4.909	-	4.909	6.857	6.721	6.793	6.880	0.000	34.562
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate a team of air and ground sensors that use Artificial Intelligence (AI) and Machine Learning (ML) to autonomously navigate and collaborate through shared perception of the optical, thermal, and electromagnetic spectrums to find, identify, geo-locate, and track targets during reconnaissance missions. This Project also complements and exploits the applied research in Program Element (PE) 0602180A (Artificial Intelligence Technologies) / Project CL7 (ATR Using Multiple Cooperative Sensors App Tech).

The cited research is consistent with Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Army Science and Technology Lethality Portfolio and the Joint Artificial Intelligence Center (JAIC).

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Collaborative Target Detection and Tracking *Description:* This effort will mature and demonstrate an AI-enabled scalable team of autonomous air and ground vehicles that will cooperatively conduct a zone recon to identify, geolocate, and track threats using on-board electronic intelligence (ELINT) and electro optical-infrared (EO-IR) sensors. *FY 2023 Plans:* Will mature and optimize the threat, terrain, and perception architecture for maneuver and threat classification at the tactical edge. Will integrate sensors to detect and geo-locate radio emissions to influence search areas and accelerate target localization. Will improve interfaces with the cloud environment by integrating ATR-MCAS with Integrated Visual Augmentation System (IVAS) voice recognition, and demonstrating a 100% cloud-based data pipeline with linkages to COEUS/cARMY on IL5. *FY 2024 Plans:* Will mature the autonomous mobility and threat perception algorithms by updating and improving the Robot Operating System (ROS) to its latest version and will provide enhanced security and faster messaging between subsystems. Will demonstrate the ability to rapidly retrain the AI algorithms using a cloud-based, machine learning pipeline. Will optimize the use of additional sensors on the robotic combat vehicle (RCV) surrogates to more precisely detect and geo-locate targets at longer ranges. Will	0.519	1.296	4.909

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CL6 *I ATR Using Multiple Cooperative Sensors Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
participate in government-run demonstrations to support technology transition. Will mature the human interfaces to the system, including Android Tactical Assault Kit (ATAK) and the Integrated Visual Augmentation System (IVAS), for faster and more intuitive target validation and shooter pairing. Will mature collaborative reconnaissance algorithms to exploit radio frequency sensor information to improve the search for targets and improve tactical maneuver. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase in FY 2024 represents the planned lifecycle of this effort to mature AI-based mobility and threat perception algorithms.			
Title: COEUS Advanced Technology ***Description:*** Will mature and optimize a cloud native AI model development architecture, mature and validate data integration techniques, and demonstrate and validate an AI model operationalization architecture to cloud or edge endpoints. ***FY 2023 Plans:*** Will optimize ATR-MCAS through the use of COEUS, a modular software platform (cloud native). ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase in FY 2024 represents the planned lifecycle of this effort.	-	0.518	-
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.069	-
Accomplishments/Planned Programs Subtotals	0.519	1.883	4.909

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*				**Project (Number/Name)** CN6 *I Predictive Maintenance Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CN6: *Predictive Maintenance Advanced Technology*	-	-	2.311	4.117	-	4.117	4.131	4.078	4.062	4.177	0.000	22.876
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates artificial intelligence (AI) and machine learning (ML) tools and capabilities to predict and analyze maintenance status for emerging and legacy aviation and ground platforms. Will extract maintenance data from databases and sensors and make inferences of missing data via virtual simulations and improve and provide AI data capture and other AI tools for enterprise maintenance resource planning for military aviation and ground vehicles. Platforms of focus will be prioritized by cost and value to Army missions and include the UH60, AH64, CH47, Stryker, and Abrams. Each platform will be sequentially evaluated both at the component (i.e. engine health) and fleet level. This Project matures and demonstrates the use of predictive maintenance to increase fleet operational readiness through reduced downtime by preventing critical failure during missions to maximize availability to combatant commands. Results from this project will inform requirements and technical architectures for a predicative maintenance platform that will include data engineering, data pipelines, AI development eco-system, and application delivery.

The cited research is consistent with Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Army Science and Technology Ground Portfolio and the Joint Artificial Intelligence Center (JAIC).

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: PMx Platform Data Management and Integrated Environment Refinement *Description:* Will mature and optimize a predictive maintenance (PMx) cloud-based environment, mature and validate data collection/aggregation techniques, and demonstrate and validate a data architecture and the data pipelines to a cloud-based environment. *FY 2023 Plans:* This effort will mature and demonstrate the integrated development, security, and operations (DevSecOps) PMx environment. Will provide the capability to aggregate data at the point of the maintenance activity and establish multiple pipelines to transition the aggregated data to a scalable, cloud-based data management environment. Will exploit the cloud-based data management architecture and initiate scaling to ground-based systems. *FY 2024 Plans:*	-	2.227	3.717

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CN6 *I Predictive Maintenance Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
This project will provide edge/cloud components and AI models and mature and demonstrate a minimum viable product. The PMx platform will be improved and optimized to provide required data, AI models, and visualizations to the local and enterprise network locations necessary for coherent maintenance operations in both autonomous (network denied) and permissive (network connected) conditions. Will improve and optimize AI models for specific use cases in field operations. Will automate common maintenance and supply trackers at the edge and in the enterprise cloud environment across multiple tactical echelons. Will develop specific architectural components for edge/cloud data pipelines, artificial intelligence development/data curation platforms (i.e., Coeus), visualization services, and cloud infrastructure nodes ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Title: PMx Autonomous Resupply ***Description:*** This effort will develop, mature, and demonstrate AI models and algorithms for an autonomous aviation platform to transport supply stocks to support operations. Emphasis will be on ensuring the airworthiness of an autonomous aviation platform that can move from a rear resupply point forward to a designated location while avoiding basic obstacles and accounting for normal weather conditions. Resupply will occur using human intervention after the autonomous aircraft safely stops in the designated end location. ***FY 2024 Plans:*** Will combine an existing autonomous flight and navigation system with an Army helicopter and/or an unmanned aerial system (UAS) and demonstrate the integrated system's ability to fly without human intervention for the delivery of supplies from a starting location to a simulated forward location. This demonstration will validate procedures to safely demonstrate this technology within the bounds of existing civil and military regulations. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This is a new effort in FY 2024.	-	-	0.400
Title: SBIR/STTR ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.084	-
Accomplishments/Planned Programs Subtotals	-	2.311	4.117

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CN6 *I Predictive Maintenance Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603040A / *Artificial Intelligence and Machine Learning Advanced Technologies*					**Project (Number/Name)** DA7 / *AI-Enabled Command and Coordination Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DA7: *AI-Enabled Command and Coordination Adv Tech*	-	-	0.777	1.396	-	1.396	1.155	1.157	1.661	1.414	0.000	7.560
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates solutions for Artificial Intelligence (AI)-enabled Command and Coordination that provide timely understanding and application of the commander's intent. This Project improves sensor-to-shooter and course of action development timelines by developing algorithms, software, and hardware to efficiently capture, transport, process, and convey complex battlefield data into user friendly, streamlined, interfaces. This Project also exploits advances in the application of game theory to explore hypothetical operational scenarios that inform mission planning. These technologies will optimize mission command and network capabilities to fully realize AI on the battlefield.

The cited research is consistent with Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports Program Executive Office (PEO) Command Control Communications-Tactical (C3T).

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: AI-Enhanced Battle Damage Assessment	-	0.749	-
Description: Will mature and demonstrate game theory-based sensor-to-shooter optimization to assign available sensors to assess effects based on target and engagement type (target acquisition to terminal effects) and incorporate the capabilities into aided target recognition algorithms using mobile cooperative autonomous sensors (ATR-MCAS) and Prometheus. ATR-MCAS utilizes data from multiple sensors and artificial intelligence technology to identify threat targets for engagement with various weapons systems. Prometheus is a system that utilizes artificial intelligence (AI) technologies to identify targets of interest from overhead satellite images.			
FY 2023 Plans: ATR-MCAS and Prometheus technologies will be improved to provide additional, autonomous sensor options that can be used to identify threats and then assess effects based on the target and engagement type. This represents the simplest form of the sensor to shooter problem and will be used as a foundation for AI-enhanced operational maneuver.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** DA7 *I AI-Enabled Command and Coordination Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned life cycle of effort.			
Title: AI-Enabled Common Operating Picture and Battle Tracking	-	-	1.396
Description: Will develop and mature AI-enabled tools that allow commanders and staff to prepare for, execute, and assess Army operations to enable decision dominance. Will mature and demonstrate human-machine interfaces that take input of commanders' intent and plans and provides computer-based battle tracking to identify risk to mission and force and AI-optimized direction to Army forces and unified action partners. *FY 2024 Plans:* Will develop Geospatial Information Services (GIS) as a Service (GISaaS) capabilities in support of development of AI-Enabled Common Operating Picture (COP). *FY 2023 to FY 2024 Increase/Decrease Statement:* This is a new effort in FY 2024.			
Title: SBIR/STTR	-	0.028	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	0.777	1.396

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*					**Project (Number/Name)** DE9 *I AI Development Environment Advanced Technology*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DE9: *AI Development Environment Advanced Technology*	-	-	-	1.406	-	1.406	-	-	-	-	0.000	1.406
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds the Army lacking a common platform to develop AI/ML. This results in siloed and duplicative work that is inefficient. Many current solutions have narrow application and are proprietary, requiring additional funding, time, and labor for even minor modifications. The AI-enabled Army of the future will require low cost, rapid AI/ML solutions at the edge. This project will mature and demonstrate a set of platform(s), and infrastructure optimized for Army use and ready for rapid employment in enterprise, multi, and hybrid cloud environments to support modular software (cloud native) intended to continuously develop and integrate AI/ML models. It will mature and demonstrate hardware and software technologies, including cloud native applications and infrastructure for globally dispersed AI/ML development collaboration, artifact sharing, automated resource provisioning, and continuous ML Operations. The AI Development Environment will provide the AI-enabled Army of the future with low cost, rapid AI/ML solutions at the edge and accelerated algorithm development for faster delivery to the field.as well as less expensive AI/ML development by leveraging shared resources.

The cited research is consistent with Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Army Science and Technology Network Portfolio and the Chief Digital and Artificial Intelligence Office (CDAO).

Work in this Project is performed by the US Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Artificial Intelligence Development Environment Advanced Technology Development	-	-	1.406
Description: Will mature and optimize a cloud native AI model development architecture, mature and validate data integration techniques, and demonstrate and validate an AI model operationalization architecture to cloud or edge endpoints. *FY 2024 Plans:* Will mature and demonstrate an architecture enabling scalable machine learning operations (MLOps) at echelon. Will improve interfaces with external data environments that serve as data lake repositories for incoming data pipelines. Will integrate data analysis software within the development environment to support ongoing model performance assessment. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603040A *I Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** DE9 *I AI Development Environment Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
This project work is a realignment in FY24 from 0603040A Project CL6.			
Accomplishments/Planned Programs Subtotals	-	-	1.406

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	20.095	45.377	33.332	-	33.332	54.853	68.619	63.768	63.187	0.000	349.231
CL9: *Collab Battlefield Networked Leth Sys Adv Tech*	-	8.547	12.279	-	-	-	8.086	19.599	12.707	11.391	0.000	72.609
CM2: *Collaborative Convergence Adv Tech Development*	-	3.428	5.182	18.381	-	18.381	31.174	33.215	35.260	35.292	0.000	161.932
CM8: *Convergence Battlefield Integration*	-	8.120	9.162	1.049	-	1.049	1.642	1.836	1.824	2.308	0.000	25.941
DA4: *All Domain Convergence Engineering & Architectures*	-	-	18.754	13.902	-	13.902	13.951	13.969	13.977	14.196	0.000	88.749

A. Mission Description and Budget Item Justification

The Program Element (PE) executes research as part of a campaign of learning to assess feasibility of technologies in an operational environment, learning from early failure and re-scope research to improve speed of response, scalability, interoperability and range of engagement. This program element will deliver integration of technologies from sensor to shooter in near real-time, from tactical to strategic level, taking a system design approach in support of All Domain Situational Awareness (CJADC2). It will enable optimal lethal and non-lethal effects across all domains using artificial intelligence and machine learning to improve how we recognize threats, augment and enhance leader decision-making, replicate tactical behaviors to enable autonomous capabilities, and design system engineering architectures to validate interoperability of technologies.

Work in this PE complements PE 0603465A (Future Vertical Lift Advanced Technology) and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Priority focus areas and the Army Modernization Strategy.

Research is performed by the United States Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*		

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	17.743	45.463	50.805	-	50.805
Current President's Budget	20.095	45.377	33.332	-	33.332
Total Adjustments	2.352	-0.086	-17.473	-	-17.473
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.352	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-17.473	-	-17.473
• FFRDC Transfer	-	-0.086	-	-	-

Change Summary Explanation

Decrease in funding is due to a move of collaborative networked battlefield technology into a broader integrated sensor to shooter project with integrated efforts from network, fires, and ground. Additionally, software integration was completed for engineering architectures and moved to BA6 for integration with the Future Concepts requirements tools.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603041A I All Domain Convergence Advanced Technology				**Project (Number/Name)** CL9 I Collab Battlefield Networked Leth Sys Adv Tech				

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CL9: *Collab Battlefield Networked Leth Sys Adv Tech*	-	8.547	12.279	-	-	-	8.086	19.599	12.707	11.391	0.000	72.609
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates dynamic Weapon-Target Pairing (WTP) fires planning and execution for maneuver forces, integration of fires and intelligence technologies, Artificial Intelligence (AI)-based decision aid implementation, and integration & demonstration of a role-based networked lethality architecture.

Work in this Project compliments PE 0602181A (All Domain Convergence Applied Research)/CM1 (Collab Battlefield Networked Leth Sys App Tech).

Work in this Project supports Next Generation Combat Vehicle, Tactical Network, Future Vertical Lift, and Long Range Precision Fires Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Distributed Lethality Architecture	3.170	3.568	-
Description: This effort provides a decision aid architecture that will integrate with current and future sensors and weapon systems to network fires for a mounted/dismounted and tactical operation center capability for Combined Arms Maneuvers. Matures and demonstrates distributed architecture and data transmission for sensor to shooter to optimize effects-based WTP. *FY 2023 Plans:* Mature fires and air space coordination systems that demonstrate four-dimension (4-D) de-confliction and speed of assets for effects delivery using decision aids for air and ground assets. Mature AI-enhanced capability trained on terrain and ballistic data to include speed of platform. Will demonstrate distributed architecture and optimized weapon target pairing capability to reduce sensor to shooter timelines. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned conclusion of this effort.			
Title: Integrated Sensor to Shooter System	3.372	3.434	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*	**Project (Number/Name)** CL9 *I Collab Battlefield Networked Leth Sys Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Demonstrates software that ingests intelligence, sensor cueing, tasking and target hand off data from/to higher and lower echelons for sensor to shooter integration. Integrates software on combat platforms to enable on-board sensor and weapon systems to execute fires missions based on decision aids' recommendations with minimal operator input. ***FY 2023 Plans:*** Mature integration with intelligence systems and current and emerging weapons systems and platforms for Fires execution at the tactical, operational and strategic levels. Demonstrate integration with joint fires architecture enabling multi-domain fires. Demonstrate role-based software running on combat platforms to joint Tactical Operations Center (TOC) at scale, to enable Warfighters' fires and effects based on decision aids' recommendations. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort.			
Title: Fires Synchronization ***Description:*** Provides real-time, joint airspace integration between airspace users and fires at various echelons to de-conflict airspace for emerging long range munitions. Matures and demonstrates algorithms for modeling adversary behavior for autonomous engagement using prior knowledge and real-time sensor data. ***FY 2023 Plans:*** Demonstrate direct/indirect joint fires planning and course of action analysis and provide multiple recommendations to the commander based on enemy common operating picture and friendly assets. Mature AI-enhanced algorithms capability to execute Fires synchronization for an increased number of nodes. Mature algorithms for modeling adversary behaviors for autonomous engagements. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort.	2.005	4.829	-
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.448	-
Accomplishments/Planned Programs Subtotals	8.547	12.279	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*	**Project (Number/Name)** CL9 *I Collab Battlefield Networked Leth Sys Adv Tech*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

 N/A

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*					**Project (Number/Name)** CM2 *I Collaborative Convergence Adv Tech Development*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CM2: *Collaborative Convergence Adv Tech Development*	-	3.428	5.182	18.381	-	18.381	31.174	33.215	35.260	35.292	0.000	161.932
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and integrates critical Project Convergence technologies and the architecture through which the Project Convergence technologies will operate. This is accomplished using adaptive data fusion and task allocation algorithm to support the development of Artificial Intelligence (AI) decision support agents. This Project includes development of advanced methods for processing and information extraction for mission oriented tasks in support of tactical decision makers. Additionally, this Project will develop the scalable architecture solutions necessary to facilitate tactical data collection, movement, processing, storage and modeling and simulation necessary to enable mission command in multi-domain operations. Also, the Project will shape early programs to accelerate technologies and achieve sensor to shooter dominance.

Work in this Project compliments Program Element (PE) 0602181A (All Domain Convergence Applied Research).

Work in this Project supports Next Generation Combat Vehicle, Long Range Precision Fires, Air and Missile Defense, Tactical Network, and Future Vertical Lift Army Modernization Priorities.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Air and Missile Defense Joint Kill Chain Decision Support Modeling and Simulation *Description:* Demonstrate interoperability of missile interceptor, sensor, and fire control enabling technology contribution to Joint Kill Chain Air and Missile Defense scenarios in support of Multi-Domain Operations (MDO).	0.686	-	-
Title: Effects in the Joint Kill Web *Description:* Virtually demonstrate kinetic and non-kinetic actions in a contested, Multi-Domain environment at all echelons. This effort seeks to ensure that the Army can readily contribute to the Joint Force in the land, air, maritime, cyber, space, and electromagnetic domains in an integrated and coordinated fashion.	0.685	4.993	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603041A / *All Domain Convergence Advanced Technology*	**Project (Number/Name)** CM2 / *Collaborative Convergence Adv Tech Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
FY 2023 Plans: Integrate, demonstrate and conduct virtual experimentation on the effects of kinetic and non-kinetic effectors to support the Army's contribution to the Joint Kill Chain. This effort will be coordinated with the Defense Advanced Research Project Agency as part of a multi-service effort. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding decrease reflects planned conclusion of this effort.			
Title: SBIR/STTR Transfer **Description:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 Plans:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding transferred in accordance with Title 15 USC §638	-	0.189	-
Title: Joint Systems Integration **Description:** This effort integrates and demonstrates tactical network and associated command, control, communication, computers, cyber, intelligence, surveillance and reconnaissance (C5ISR) technologies in Multi-Domain Operations (MDO) laboratory experiments through live, virtual, and constructive environments. The effort will integrate these technologies for? tactical ground, air, air and missile defense, fires, network platforms and other missions to demonstrate system of systems integration and evaluate operational performance in representative MDO scenarios during laboratory experiments. **FY 2024 Plans:** Will demonstrate advancing C5ISR technologies in risk reduction events, such as communication exercises, in advance of field experiments (e.g. Project Convergence); will mature and demonstrate integrated risk reduction capability between laboratory and field, such as inclusion of tactical units connected to laboratory environments; will provide advanced network replication environments, such as the inclusion of electronic warfare injection. **FY 2023 to FY 2024 Increase/Decrease Statement:** This effort is reinitiated in FY24.	0.686	-	7.300
Title: Analytics for Convergence Technology Integration	0.685	-	3.000

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603041A / *All Domain Convergence Advanced Technology*	**Project (Number/Name)** CM2 / *Collaborative Convergence Adv Tech Development*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Validate maturity of battlefield integration of Army ground and air assets with all sensor and command assets via the Tactical Network (TN) by collecting, providing, optimizing, and fully exploiting available data concerning system and system-of-systems interface performance and effectiveness. *FY 2024 Plans:* Will provide threat environments for validated demonstration of the highest Army priority battlefield systems in FY24. Will mature and demonstrate the technical connectivity and tactical integration between those systems and all other relevant Army and Joint systems. Will optimize technologies under advanced development by scientists, technologists, system developers, and system analysts. *FY 2023 to FY 2024 Increase/Decrease Statement:* This effort is reinitiated in FY24.			
Title: Convergence Ground and Aviation Platform Integration *Description:* Integration of ground and aviation efforts in direct support of maturing and demonstrating Project Convergence capabilities. This effort matures and demonstrates ground vehicle technologies as an integrated system and system of systems to reduce sensor to shooter targeting time, increase real-time battlefield understanding and ensure communications across all echelons. It also integrates capabilities such as geo-location and identification of targets from Army aviation assets, air to ground situational awareness and target data exchange, exchange of unmanned asset control, advanced tactical and teaming behaviors, synchronized data management, and efficient usage of air lethality assets. Lastly it focuses on the integration of ground and aviation capabilities to demonstrate Multi-Domain Operations as part of Project Convergence. *FY 2024 Plans:* Will mature and demonstrate additional ground vehicle and aviation integration, multi-platform, and multi-service network communication and perform analytics to inform requirements for both present and future tactical and combat military air and ground vehicles and against a complex moving enemy in a Multi-Domain Operational environment. The Army's modernization enterprise is integrated with that of the Joint Force. Networked aided target detection and recognition, networked survivability, autonomous tactical behaviors, AI-enabled decision support agent, and data management technologies on multiple ground and aviation platforms are critical to success on the modern battlefield. *FY 2023 to FY 2024 Increase/Decrease Statement:* This effort is reinitiated in FY24.	0.686	-	8.081
Accomplishments/Planned Programs Subtotals	3.428	5.182	18.381

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*	**Project (Number/Name)** CM2 *I Collaborative Convergence Adv Tech Development*

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*					**Project (Number/Name)** CM8 *I Convergence Battlefield Integration*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CM8: *Convergence Battlefield Integration*	-	8.120	9.162	1.049	-	1.049	1.642	1.836	1.824	2.308	0.000	25.941
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project integrates and demonstrates aided target detection and recognition, autonomous tactical behaviors, Artificial Intelligence (AI)-enabled decision support agent, and data management technologies in Multi-Domain Operations (MDO) field experiments. This Project integrates these technologies on tactical ground, air, air and missile defense, fires, network platforms and other missions to demonstrate reduced sensor to shooter timelines and evaluate operational performance in representative MDO scenarios during annual field experiments.

Work in this Project is done in coordination with Program Element (PE) 0602181A (All Domain Convergence Applied Research).

Work in this Project supports Next Generation Combat Vehicle, Tactical Network, and Future Vertical Lift Army Modernization Priorities.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Convergence Ground Platform System Integration	6.063	5.420	-
Description: Integration of ground efforts in direct support of maturing and demonstrating Project Convergence capabilities. This effort matures and demonstrates ground vehicle technologies as an integrated system and system of systems to reduce sensor to shooter targeting time, increase real-time battlefield understanding and ensure communications across all echelons. *FY 2023 Plans:* Develop integration and assessment capability with networked aided target detection and recognition, autonomous tactical behaviors, AI-enabled decision support agent, and data management technologies on multiple ground platforms. Mature and demonstrate additional ground vehicle integration, multi-platform, multi-service, multi-national network communication and perform analytics to inform requirements for both present and future tactical and combat military vehicles against a complex moving enemy in an MDO environment. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 **/** 3	**R-1 Program Element (Number/Name)** PE 0603041A **/** *All Domain Convergence Advanced Technology*	**Project (Number/Name)** CM8 **/** *Convergence Battlefield Integration*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
This work was administratively realigned to Project CM2 (Collaborative Convergence Adv Tech Development).			
Title: Convergence Aviation Platform Integration	2.057	2.406	-
Description: Integration of Aviation/Future Vertical Lift efforts in direct support of maturing and demonstrating Project Convergence capabilities. Focus is on integration of capabilities such as geo-location and identification of targets from Army aviation assets, air to ground situational awareness and target data exchange, exchange of unmanned asset control, advanced tactical and teaming behaviors, synchronized data management, and efficient usage of air lethality assets. *FY 2023 Plans:* Integrate additional and updated capabilities developed under Full Spectrum Targeting effort (detection, recognition and identification of hidden and decoy targets, sensor fusion), MSET to engage targets autonomously, Advanced Teaming (supervised autonomous mission commands, various payloads), XM915 20mm cannon, and Integrated Mission Equipment (platform-agnostic architecture for S&T efforts integrated with each other) in support of capability demonstrations. *FY 2023 to FY 2024 Increase/Decrease Statement:* This work was administratively realigned to Project CM2 (Collaborative Convergence Adv Tech Development).			
Title: Convergence Joint and Multinational Integration	-	1.002	-
Description: Integration with Joint and Multi-National Partner technologies to demonstrate cross domain capabilities and concepts. *FY 2023 Plans:* Integrate technologies and data architectures between Army, Joint, and Multi-National Partners. *FY 2023 to FY 2024 Increase/Decrease Statement:* This work was administratively realigned to Project CM2 (Collaborative Convergence Adv Tech Development).			
Title: SBIR/STTR Transfer	-	0.334	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: Coordinated Lethality Advanced Development	-	-	1.049

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*	**Project (Number/Name)** CM8 *I Convergence Battlefield Integration*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort investigates commercial off the shelf items to determine those with high reward for use in achieving lethality across domains. *FY 2024 Plans:* Investigate commercial off the shelf technologies with the intent of achieving increased lethality through reconnaissance and surveillance capabilities. *FY 2023 to FY 2024 Increase/Decrease Statement:* This effort is a Fiscal Year (FY) 2024 new Start.			
Accomplishments/Planned Programs Subtotals	8.120	9.162	1.049

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3					**R-1 Program Element (Number/Name)** PE 0603041A I *All Domain Convergence Advanced Technology*				**Project (Number/Name)** DA4 I *All Domain Convergence Engineering & Architectures*		
COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DA4: *All Domain Convergence Engineering & Architectures*	-	-	18.754	13.902	-	13.902	13.951	13.969	13.977	14.196	0.000	88.749
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project enables critical engineering and architecture support to all Army modernization priorities as the Army pursues convergence. Full development of mature system and system of systems level architectures ensure objective and data-driven analyses can be performed on new Army technologies and modernization efforts. Development of digital engineering products for new Army technologies currently under development enable digital analyses and assessments to be performed rapidly and repeatedly prior to full scale field tests like Project Convergence.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work is performed by the United States (U.S.) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: Engineering for Architectures	-	13.069	13.902

Description: The engineering and architecture project provides critical systems engineering and codesigning of systems at the design phase in a digital engineering environment to improve performance and integration. This includes development and integration of architecture and engineering products from system level to a full system of systems level, models and simulations, software engineering, and other key efforts to support senior leader decisions.

FY 2023 Plans:
Will integrate system and system of system level architectures to represent current design of the Army Modernization Priority systems in a model-based architecture to conduct analysis on how systems within the six Army Modernization Priorities provide an integrated solution in Multi-Domain Operations. Will perform analysis through modeling and simulation to inform Project Convergence and generate design engineering artifacts to inform the development of systems.

FY 2024 Plans:
Will develop and integrate system and system of systems level architectures of signature modernization priorities into a full Army Materiel Enterprise architecture baseline. Will leverage system of systems architecture in performing assessments of new and evolving system requirements to ensure system of systems integration in support of the Army of 2030 and 2040. Will perform portfolio health assessment modeling and simulation to inform Project Convergence and generate digital engineering artifacts. Will leverage system of systems architectures and engineering artifacts to inform cross warfighting function assessments to support

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603041A *I All Domain Convergence Advanced Technology*	**Project (Number/Name)** DA4 *I All Domain Convergence Engineering & Architectures*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
senior leader decisions. Will leverage system of systems architectures and engineering artifacts to support AFC's mission of Delivering Army 2030 and Designing Army 2040. Designing Army 2030 support includes documenting DOTMLPF-P integrated architecture to ensure Army 2030 is delivered on time. Designing Army 2040 support includes assessing new formation based requirements against the baseline architecture to assess changes in performance between Army 2030 and Army 2040. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding reflects planned lifecycle of effort.			
Title: Technology Integration Analysis for Army Modernization Priorities ***Description:*** Conduct independent assessments of the feasibility, scalability and interoperability of technologies evaluated in an all-domain convergence environment. Primary focus will be to develop and assess architectures, develop models and simulations to support trade studies and decision making across the Army Modernization Priority technologies, and evaluation of planned demonstration efficacy. ***FY 2023 Plans:*** Will conduct independent assessments of modernization priorities, Project Convergence planning support, senior leader directed studies, and M&S development in support of modernization priorities and Project Convergence. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort.	-	2.000	-
Title: Army Capability Architecture Development and Integration Environment (ArCADIE) ***Description:*** ArCADIE will develop and demonstrate the Army's authoritative cloud-based data source for Army Architectures, data and tools. This effort develops ArCADIE enhancements, architectures, and dashboards to enable experimentation, capability development, and S&T efforts in support of Army modernization. ***FY 2023 Plans:*** Will enhance the classified and unclassified cloud-based environment providing architecture development and analytical capabilities to ensure relevant and timely data and artifacts as part of Model Based Systems Engineering efforts to support integration across Army Modernization Priorities. Will develop intelligent graphical interfaces that allow visibility of integrated architecture data and artifacts to support Model Based Systems Engineering. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort.	-	3.000	-
Title: SBIR/STTR	-	0.685	-

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603041A / *All Domain Convergence Advanced Technology*	**Project (Number/Name)** DA4 / *All Domain Convergence Engineering & Architectures*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	18.754	13.902

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army | | | | | | | | | | Date: March 2023 | |

| Appropriation/Budget Activity
2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)* | R-1 Program Element (Number/Name)
PE 0603042A *I C3I Advanced Technology* |

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	3.036	12.716	19.225	-	19.225	23.223	20.022	22.011	21.622	0.000	121.855
CN3: *Network Enabling University Adv Development*	-	3.036	3.993	4.031	-	4.031	3.924	3.587	3.590	3.629	0.000	25.790
CX7: *Intelligent Env Battlefield Awareness Adv Tech*	-	-	4.892	6.396	-	6.396	10.661	10.185	8.571	6.543	0.000	47.248
CX8: *Persistent Geophysical Sensing-Infrasound Adv Tech*	-	-	2.334	2.635	-	2.635	3.131	2.081	2.606	2.988	0.000	15.775
CX9: *Sensing in Contested Environments Adv Technologies*	-	-	1.082	1.104	-	1.104	2.079	0.151	-	2.983	0.000	7.399
CZ5: *Subterranean Detection and Monitoring Adv Tech*	-	-	0.415	1.272	-	1.272	1.429	1.430	2.323	-	0.000	6.869
DB5: *Enabling Long Standoff 3D (ELS3D) Adv Tech*	-	-	-	1.045	-	1.045	1.999	2.588	4.921	5.479	0.000	16.032
DE7: *Understanding Environment as a Threat Adv Tech*	-	-	-	2.742	-	2.742	-	-	-	-	0.000	2.742

A. Mission Description and Budget Item Justification

This Program Element (PE) matures, demonstrates, optimizes, and validates Network Command, Control, Communications, and Intelligence (C3I) technologies through the integration of future equipment and systems that improve overmatch and meet mission needs in the future operating environments. This PE provides mid-to-long term tactical C3I capabilities (e.g. networking, cyber, electronic warfare, Positioning, Navigation, and Timing (PNT), space, persistent surveillance) based upon promising technologies that address emerging and future threats, and includes research critical and unique to the Army and DoD. Efforts focus on advanced maturation and demonstration of materials, technologies, methodologies and systems that span the range from electronics, protective technologies, electronic warfare, and mission support capabilities such as situational awareness. These efforts directly inform and transition key capabilities to Army programs of record that support the Army modernization priorities.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army				**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	3.151	12.716	16.409	-	16.409
Current President's Budget	3.036	12.716	19.225	-	19.225
Total Adjustments	-0.115	0.000	2.816	-	2.816
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.115	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	2.816	-	2.816

Change Summary Explanation

Increase in funding is due to two new start efforts to support integration and demo of low-SWAP, and risk assessments in complex urban environments.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603042A I C3I Advanced Technology					Project (Number/Name) CN3 I Network Enabling University Adv Development			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CN3: Network Enabling University Adv Development	-	3.036	3.993	4.031	-	4.031	3.924	3.587	3.590	3.629	0.000	25.790
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced Network Command, Control, Communications, and Intelligence (C3I) technologies into future equipment and systems. This Project accelerates advanced technologies originating from extramural research in academia, will enable intelligent networks, self-sensing/self-healing network, network security, advanced teaming and operations in a Global Positioning System (GPS) degraded or denied environment. This Project also accelerates the Army modernization in next generation Network and Assured Positioning, Navigation, and Timing (APNT) systems. Work in this Project will lead to emerging technologies in areas of strategic importance to the Army in communications and networking, by engaging competitively selected Universities.

Work in this Project complements Program Element (PE) 0602182A (C3I Applied Research) / Project CN4 (Network Enabling University Applied Research).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Intelligent, Secure and Self-Sensing/Self-Healing Networks **Description:** Mature and integrate advanced intelligent network solutions with autonomous or self-sensing intelligence to deny corruption, and/or attacks and to execute operational missions securely and reliably. **FY 2023 Plans:** Will continue maturation of artificial intelligence and machine learning (AI/ML) software for Network technologies, predictive analytics software, intelligent data integration software, edge computer processing platforms, edge sensing systems, and other technologies; Will demonstrate these algorithms on simulator software built to emulate tactical networks using the network topologies and positions that are produced in on-field situations, as well as Army experimental platform/devices. **FY 2024 Plans:** Will continue maturation and demonstration of AI/ML emerging technologies for Network solutions, optimal network usage and network inference, RF-based deceptive tactical networks, improve cyber defense systems through secure and reliable ML, multi-modal and multi-vantage sensing for joint inference, and network localization. **FY 2023 to FY 2024 Increase/Decrease Statement:**	0.361	0.400	0.420

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CN3 *I Network Enabling University Adv Development*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase reflects planned lifecycle of this effort.			
Title: Advanced Real-Time Tactical Networks	1.262	1.346	1.307
Description: Develop tactical network technology platforms consisting of a fleet of ground and air vehicles that will perform an autonomous reconnaissance mission in a relevant environment. *FY 2023 Plans:* Will continue to develop, and integrate Artificial Intelligence/Machine Learning Autonomy-related algorithms with improved holistic network functionalities, overlay for reliably supporting tactical cyberphysical systems over unreliable communication and computation networks for advanced teaming operations. Will demonstrate cache network with information reuse across components and continue to integrate mature technologies with/to experimental Ground and Air platforms for accelerated development and prototyping. Will mature algorithms for collaborative RF sensing and inference for distributed tactical networks and demonstrate on Army network testbeds. *FY 2024 Plans:* Mature and demonstrate an information network that will resiliently support information pathways for sensing, computing, and control in cyber-physical systems, such as autonomous vehicle teams over unreliable communication networks. Mature and demonstrate an information network that responds dynamically to changes in operating conditions through real-time adaptation and evolution to enable continuity of the core services that it provides to the networked system. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: Advanced Sensors and Non-GPS PNT Systems	1.413	2.101	2.304
Description: Develop advanced sensors with enhanced signal processing software/algorithms to improve assurance against both electronic and kinetic attacks relative to GPS, and that can provide matured Positioning, Navigation and Timing (PNT) technology in disrupted, degraded or denied Global Positioning System (GPS) environments. *FY 2023 Plans:* Will continue to design, fabricate, and integrate GPS signal integrity monitoring global and tactical sensors and reporting systems to enhance Soldier awareness in disrupted, degraded or denied GPS environments and inform regarding local threat emitter detection, characterization and geolocation. Will mitigate effects of threats on Soldier PNT solution. *FY 2024 Plans:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CN3 *I Network Enabling University Adv Development*		

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will continue the development and integration of GNSS global and tactical sensors, exploitation of LEO satellites for robust PNT back up to GPS, and demonstrate capability on a sensor fusion framework. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.146	-
Accomplishments/Planned Programs Subtotals	3.036	3.993	4.031

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army									**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*					**Project (Number/Name)** CX7 *I Intelligent Env Battlefield Awareness Adv Tech*		

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CX7: *Intelligent Env Battlefield Awareness Adv Tech*	-	-	4.892	6.396	-	6.396	10.661	10.185	8.571	6.543	0.000	47.248
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project optimizes and demonstrates technologies to allow Soldiers to maneuver faster around or through existing environmental (urban/industrial) conditions and physical landscape constraints. This effort matures and demonstrates web modules/software tools delivering crucial geo-chemical resources and advanced knowledge of geo-environmental infrastructure to mission planners. This Project delivers critical technologies that provide situational awareness for multi-source intelligence, particularly for anti-access/area denied (A2/AD) outside the continental United States (OCONUS) sites.

Work in this Project complements PE 0602182A (C3I Applied Research) / Project CX3 (Intelligent Env Battlefield Awareness Apl Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Arctic Threats Demonstrations *Description:* This effort matures and demonstrates visualization tools which enable geospatial decisions based on anticipated physical threats, hazards and dependencies posed by terrain and weather extremes in cold regions. *FY 2023 Plans:* Integrate weather models into high resolution remotely sensed terrain data platform demonstrating terrain state changes such as freeze/thaw, snowmelt, and ice vulnerability to aid in preventing risks to operational effectiveness and efficiency in cold regions. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle conclusion of this effort and capability transition to Predictive GIS Mapping (physical) Demonstration.	-	1.082	-
Title: Geo-Forensics for Reconnaissance Exploitation *Description:* This effort provides unique terrestrial patterns to describe and predict the geological, biological, and overall ecological information associated with anti-access/area denial (A2/AD) sites from the continental United States (CONUS) analogs.	-	0.985	1.134

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CX7 *I Intelligent Env Battlefield Awareness Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Demonstrate geospatial platform implementation of geo-forensic predictive framework to geo-locate unknown soil samples and predict soil provenance. *FY 2024 Plans:* Will provide a global soil analog tool application in which soil diversity and functionality can be predicted to inform mobility operations. Will also provide final documentation of geo-forensic capabilities for predicting soil provenance and properties within a predictive GIS platform. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle of this effort scheduled to complete in FY 2024.			
Title: Predictive Geographic Information Systems (GIS) Mapping (physical) Demonstration *Description:* This effort reduces the impact of unknown and changing terrain conditions by automating the integration of disparate datasets and overlays of terrain obstacles producing a high-fidelity map that integrates soil composition, vegetation, hydrology, and permafrost/ice data. *FY 2023 Plans:* Prototype, validate, and integrate geospatial tools describing geophysical models in a unified geospatial framework. *FY 2024 Plans:* Will integrate high resolution remotely sensed weather models demonstrating terrain state changes such as freeze/thaw, and global soil analog tools into a predictive GIS platform. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle for this effort for model integration.	-	1.585	1.248
Title: Hydrology Mapping Demonstrations *Description:* This effort matures and demonstrates data tools and models to support high-fidelity battlefield overlay maps that accurately show hydrologic/soil moisture threats (soil, hydrology, and snow/ice) not captured by current terrain mapping capabilities. *FY 2023 Plans:* Demonstrate existing hydrologic and watershed tools and integrate applied research products (data, models, and algorithms) in the Predictive GIS platform. *FY 2024 Plans:*	-	0.473	1.753

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3		**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CX7 *I Intelligent Env Battlefield Awareness Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will mature hydrologic modeling to support soil moisture change predictions on a prototype GIS platform from field data gained at CONUS test bed sites. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned field experiments at three CONUS test bed sites.			
Title: Vegetation Property Demonstrations ***Description:*** This effort correlates forest metrics with other Intelligent Environmental Battlefield Awareness Tech threat area parameters to inform global ecological analogues in areas with limited data. ***FY 2023 Plans:*** Generate datasets and demonstrate models that identify global-scale forest ecotones that inform regional planning. ***FY 2024 Plans:*** Will validate interactive machine learning models to assign to global forest analogs (e.g., digital forest twins) incorporated from the U.S. Forest Service. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects the planned lifecycle of this effort.	-	0.588	0.627
Title: Extreme Environmental Effects on Operations Demonstrations ***Description:*** This effort designs and develops modeling of natural terrain following extreme disturbances that impact operational environments such as wildfires, flash floods, earthquakes and landscape changes induced by high intensity military conflict. ***FY 2024 Plans:*** Will assess sources and linkages to meet foundational and dynamic environmental data requirements for extreme event capabilities within a predictive GIS platform. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned initiation of this effort.	-	-	1.634
Title: SBIR/STTR ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:***	-	0.179	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CX7 *I Intelligent Env Battlefield Awareness Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	4.892	6.396

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*					**Project (Number/Name)** CX8 *I Persistent Geophysical Sensing- Infrasound Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CX8: *Persistent Geophysical Sensing-Infrasound Adv Tech*	-	-	2.334	2.635	-	2.635	3.131	2.081	2.606	2.988	0.000	15.775
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates kitted hardware and software solutions that provide passive, persistent, non-line-of-sight, multi-modal sensing capable of providing fused battlefield intelligence for increased situational awareness in a dynamic operational environment. These technologies provide near-real-time data collection, processing, and alerting on evolving cross-domain threats including strategic and tactical fires, air and ground platforms, as well as critical transportation infrastructure (bridges) and explosive events with applications for deep sensing. These technologies deliver time-critical intelligence for engineer and intelligence communities to provide decisive advantage.

Work in this Project complements PE 0602182A (C3I Applied Research) / Project CX4 (Persistent Geophysical Sensing-Infrasound Apl Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed at the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Battlefield Intelligence by Geophysical Sensing (BIGS) Demonstration	-	2.249	2.635
Description: This effort matures and demonstrates geophysical and geo-sensing technologies to persistently assess battlefield elements to include infrastructure (algorithm refinements) and additional sources of interest, such as explosive and fires events and various threats. Optimization of the array sensors and geometry to improve array performance for new sources of interest while reducing logistics will also be matured and demonstrated. New detection and classification signal processing algorithms will be validated throughout the life of the task in a phased demonstration schedule. ***FY 2023 Plans:*** Validate and demonstrate classification algorithms of sources of interest as determined by stakeholders and provide software updates; and utilize a military user assessment to evaluate alternate array geometry for feedback loop. ***FY 2024 Plans:*** Will optimize and demonstrate algorithm components. Will demonstrate alternate array geometry in a simulated operational environment. ***FY 2023 to FY 2024 Increase/Decrease Statement:***			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CX8 *I Persistent Geophysical Sensing-Infrasound Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding increase reflects planned lifecycle of this effort to support demonstrations with transition partner, Program of Record ENFIRE.			
Title: SBIR/STTR Transfer	-	0.085	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	2.334	2.635

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603042A / C3I Advanced Technology					**Project (Number/Name)** CX9 / Sensing in Contested Environments Adv Technologies		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CX9: Sensing in Contested Environments Adv Technologies	-	-	1.082	1.104	-	1.104	2.079	0.151	-	2.983	0.000	7.399
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced sensor technologies that characterize hazards posed to warfighters by non-weaponized biological hazards in subterranean environments. Demonstrations of previously developed sensor packages and adaptive commercial off the shelf sensor technologies on existing unmanned ground vehicles (UGV) platforms to gather end-user feedback. The capabilities resulting from this project provide Soldiers the capability to understand biological hazards present in subterranean environments and take necessary steps to mitigate or avoid these threats.

Work in this Project complements PE 0602182A (C3I Applied Technology) / Project CX5 (Sensing in Contested Environments Technologies).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed at the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Non-traditional Threat Detection in Contested Environments Tech	-	1.043	1.104
Description: This effort identifies, examines, prioritizes, and exploits commercial of the shelf capabilities from multiple sources that can accurately detect biological and water quality hazards relevant to operations in subterranean environments from point of ingress/egress to evaluate exposure potential and affects. **FY 2023 Plans:** Demonstrate a new sensor with the ability to detect 1-3 macroscopic organisms; Also evaluate field-ready COTS sensors that utilize polymerase chain reaction (PCR) and DNA sequence technologies to accurately detect biological hazards. **FY 2024 Plans:** Will demonstrate macroscopic and microscopic organism classification and hazard detection in a field realistic environment. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding increase reflects the planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.039	-
FY 2023 Plans:			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CX9 *I Sensing in Contested Environments Adv Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	1.082	1.104

C. Other Program Funding Summary ($ in Millions)

  N/A

Remarks

D. Acquisition Strategy

  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*					**Project (Number/Name)** CZ5 *I Subterranean Detection and Monitoring Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CZ5: *Subterranean Detection and Monitoring Adv Tech*	-	-	0.415	1.272	-	1.272	1.429	1.430	2.323	-	0.000	6.869
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project validates and demonstrates advanced subterranean monitoring and vulnerability assessment technologies providing mobile and man-portable solutions to enhance survivability and threat awareness during urban operations and negate enemy subterranean operation advantage. This Project also optimizes and demonstrates enhanced technologies to detect tunnels and tunneling activity in complex and varied environments. These capabilities are critical to provide greater situational awareness of the subterranean domain and enhanced survivability for the Soldier.

Work in this Project complements Program Element (PE) 0602182A (Network C3I Enabling Technologies) / Project CX6 (Subterranean Detection and Monitoring Apl Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Cavity Assessment in Variable Environments-Subterranean (CAVES) Demonstrations	-	0.400	1.272
Description: This effort validates and demonstrates an integrated suite of tunnel detection and perimeter security systems for application in variable terrain, and complex geologic environments, such as mountains, and hard rock geology common in the western pacific.			
FY 2023 Plans: Validate which legacy tunnel detection systems will be evaluated in demonstrations in FY24 in hard rock geology.			
FY 2024 Plans: Will conduct field experimentation to baseline capabilities of tunnel detection and perimeter security technologies in an operationally relevant environment.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*	**Project (Number/Name)** CZ5 *I Subterranean Detection and Monitoring Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding increase reflects the planned lifecycle of this effort to align resources for demonstrations as technologies are transitioned from PE 0602182A (Network C3I Enabling Technologies) / Project CX6 (Subterranean Detection and Monitoring Apl Tech).			
Title: SBIR/STTR Transfer	-	0.015	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	0.415	1.272

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603042A / *C3I Advanced Technology*					Project (Number/Name) DB5 / *Enabling Long Standoff 3D (ELS3D) Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DB5: *Enabling Long Standoff 3D (ELS3D) Adv Tech*	-	-	-	1.045	-	1.045	1.999	2.588	4.921	5.479	0.000	16.032
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Enabling Long Standoff 3D (ELS3D) Adv Tech is a new start within the C3I Advanced Technology program in FY 2024.

This is a New Start FY 2024

A. Mission Description and Budget Item Justification

This Project will integrate and demonstrate a fully matured low-SWAP laser transmitter, processing algorithms and calibration models tailored for higher resolution 3D data collections over larger areas from longer stand-off for mapping, Intelligence Surveillance and Reconnaissance (ISR) and targeting.

Work in this Project complements PE 0602182A (Network C3I Enabling Technologies) / Project DB4 (Enabling Long Standoff 3D (ELS3D) Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Enabling Long Standoff 3D (ELS3D) Demonstration	-	-	1.045
Description: This effort will demonstrate and integrate a prototype airborne system to collect long standoff high-resolution quick turnaround 3D data. *FY 2024 Plans:* Will conduct hardware design for SWAP-optimization of lidar components, as initial phase of the advanced collection methodology. *FY 2023 to FY 2024 Increase/Decrease Statement:* This is a New Start in FY 2024			
Accomplishments/Planned Programs Subtotals	-	-	1.045

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology	Project (Number/Name) DB5 / Enabling Long Standoff 3D (ELS3D) Adv Tech

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603042A *I C3I Advanced Technology*					**Project (Number/Name)** DE7 *I Understanding Environment as a Threat Adv Tech*		

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
DE7: *Understanding Environment as a Threat Adv Tech*	-	-	-	2.742	-	2.742	-	-	-	-	0.000	2.742
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2024 funding is realigned from Program Element (PE) 0603463A (Network C3I Advanced Technology) / Project AR6 (Understanding the Environment as a
Threat Adv Tech)

A. Mission Description and Budget Item Justification

This Project matures and demonstrates tools that provide capability to inform the Solider of different routes through a complex urban landscape. Optimizes tools that balance exposure to environmental threats with mission constraints to provide a risk versus reward capability of operating in different areas of the urban theater. This Project matures and demonstrates predictive software accurately integrating the risks of physical, chemical, and biological threats in an urban environment into route planning tools.

Work in this Project complements Program Element (PE) 0602182A (C3I Applied Technology) / Project DE6 (Understanding the Environment as a Threat Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Environmental Threat Technology Demonstrations for route planning	-	-	0.682
Description: This effort matures and demonstrates a software tool that informs and balances the risk of exposure to environmental threats with maneuver constraints along potential routes. The software integrates the risks associated with different environmental matrices in complex urban environments and includes the capability for routing in off-road scenarios. **FY 2024 Plans:** Will demonstrate operational viability of individual course-forecasting algorithms. Will demonstrate final threat-overlay software products and validate performance within an established interface. **FY 2023 to FY 2024 Increase/Decrease Statement:**			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603042A / *C3I Advanced Technology*	**Project (Number/Name)** DE7 / *Understanding Environment as a Threat Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding reflects the final year of Technical Readiness Level (TRL) 6 demonstration for this effort.			
Title: Hazard Prediction Demonstration	-	-	1.030
Description: This effort matures and demonstrates a mission planning platform that provides Soldiers with a predictive visualization technology to identify, track and plan for industrial or commercial chemical/environmental threats in operational environments. **FY 2024 Plans:** Will demonstrate and validate suite of standalone air, water, and soil media model algorithms using toxic industrial chemical/material (TIC/TIM) databases. Will demonstrate final threat-overlay software product and validate performance within an established interface. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding reflects the planned lifecycle of this effort.			
Title: Subsurface Forensics Demonstration	-	-	1.030
Description: This effort matures and demonstrates sensing technologies for TIC/Ms to detect illicit activities with authentic wastewater treatment influent. **FY 2024 Plans:** Will validate capabilities to exploit pre-existing physical, chemical, and biological information from urban subterranean systems for threat identification with special and temporal resolution in current and future operational environments. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding increase the planned lifecycle of this effort as work transitions from PE 0602146A, Network C3I Technology, Project AR3 Intelligent Environmental Battlefield Awareness for maturation and demonstration.			
Accomplishments/Planned Programs Subtotals	-	-	2.742

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603043A I *Air Platform Advanced Technology*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	0.727	17.946	14.165	-	14.165	16.126	19.159	21.644	23.624	0.000	113.391
CL4: *Air Platform Enabling University Adv Development*	-	0.727	1.251	1.367	-	1.367	1.463	1.165	1.166	1.179	0.000	8.318
CV1: *Control & Autonomy for Tactical Superiority Adv*	-	-	1.140	1.254	-	1.254	1.254	1.151	1.152	1.164	0.000	7.115
CV2: *Structures Platform Int Resilience & Efficiency*	-	-	3.124	3.358	-	3.358	5.138	6.549	5.148	5.204	0.000	28.521
CX1: *Advanced Rotors Advanced Tech*	-	-	2.618	2.657	-	2.657	2.684	2.687	2.689	2.718	0.000	16.053
CX2: *Next Generation Aviation Transmission Adv Tech*	-	-	4.389	-	-	-	-	-	2.638	4.373	0.000	11.400
DC3: *HPC For Army Aviation Concepts*	-	-	5.424	5.529	-	5.529	5.587	7.607	8.851	8.986	0.000	41.984

Note

In FY 24, funding is realigned from Project CX2 (Next Generation Aviation Transmission Adv Tech) to fund higher priority projects in the Army.

A. Mission Description and Budget Item Justification

This Program Element (PE) undertakes advanced technology efforts that support and enable the overall Army Aviation portfolio in general, and the Army's modernization priority for Future Vertical Lift (FVL). Vital and enduring research into advanced technologies is conducted pertinent to the air portfolio that supports mid-to-long term requirements in contested operational environments and technologies that have broad application to FVL modernization, as well as overall Army and specific Department of Defense (DoD) aviation needs.

Research in this PE contributes to the Army Science and Technology (S&T) air systems portfolio and is fully coordinated with efforts in PE 0602148A (Future Vertical Lift Technology), PE 0603465A (Future Vertical Lift Advanced Technology) and PE 0602183A (Air Platform Applied Research).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas and the Army Modernization Strategy.

Research in this PE is performed by the United States Army Futures Command (AFC) and the Engineer Research and Development Center (ERDC).

PE 0603043A: *Air Platform Advanced Technology*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	0.754	17.946	18.557	-	18.557
Current President's Budget	0.727	17.946	14.165	-	14.165
Total Adjustments	-0.027	0.000	-4.392	-	-4.392
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.027	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-4.392	-	-4.392

Change Summary Explanation

In FY24, funding is decreased to fund higher priority efforts in the Army.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 I 3					R-1 Program Element (Number/Name) PE 0603043A I *Air Platform Advanced Technology*				Project (Number/Name) CL4 I *Air Platform Enabling University Adv Development*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CL4: *Air Platform Enabling University Adv Development*	-	0.727	1.251	1.367	-	1.367	1.463	1.165	1.166	1.179	0.000	8.318
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project focuses on experimentation and demonstration of advanced technologies originating from extramural applied research in academia pertaining to navigation/ routing, autonomous robotic vehicles, artificial intelligence and machine learning as applied to aerial mobility and maneuver, holistic survivability, teaming, integrated mission systems, air-launched effects, and other innovative air enabling applied research technologies, that will accelerate the Army modernization in next generation aerial vehicles. This Project will mature and integrate advanced efforts to focus more on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies fundamental to the modernization priorities. This effort conducts and demonstrates advanced technology efforts arising from academic research in all areas of strategic importance to Army Aviation in artificial intelligence / machine learning (AI/ML), autonomous teaming systems, survivability, aeromechanics, advanced vertical take-off and landing (VTOL) design & concepts, flight dynamics, vibration & noise control, propulsion, human factor engineering and structures and materials, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances. The Project will continuously experiment with methods to identify, demonstrate and transition novel technology from entities that might not otherwise collaborate with the Department of Defense (DoD), with the end goal of accelerating the adoption of cutting-edge applied research technology for the warfighter in the Army aviation portfolio.

Work in this Project complements Program Element (PE) 0603465A (Future Vertical Lift Advanced Technology), PE 0603119A (Ground Advanced Technology), PE 0602148A (Future Vertical Lift Technology) and PE 0602183A (Air Platform Applied Research).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Teaming	0.320	-	-
Description: Demonstrate and integrate capabilities to self-organize and coordinate large teams of unmanned vehicles participating in long-term reconnaissance operation using distributed command/control architectures despite communication delays and/or failures and showcasing resilience to wide-area jamming.			
Title: Coordinated Air-Ground Vehicle Maneuvering	0.407	-	-
Description: Demonstrate and integrate a technology prototype platform consisting of a fleet of ground and air vehicles that will perform an autonomous reconnaissance mission in a relevant environment.			

PE 0603043A: *Air Platform Advanced Technology*
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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*	**Project (Number/Name)** CL4 *I Air Platform Enabling University Adv Development*		

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Vertical Lift Advanced Technologies	-	1.205	1.367
Description: Conduct advanced development within academia to mature and integrate Vertical Lift research of promising and emerging technologies. *FY 2023 Plans:* Will mature and integrate emerging technologies in areas of autonomous teaming systems, survivability, aeromechanics, advanced VTOL design & concepts, flight dynamics, vibration & noise control, propulsion, human factor engineering and structures & materials. *FY 2024 Plans:* Will continue to mature and integrate rotorcraft emerging technologies through autonomous teaming systems, aeromechanics, advanced VTOL design & concepts, flight dynamics models to extend reach, and agility. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.046	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	0.727	1.251	1.367

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*				**Project (Number/Name)** CV1 *I Control & Autonomy for Tactical Superiority Adv*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CV1: *Control & Autonomy for Tactical Superiority Adv*	-	-	1.140	1.254	-	1.254	1.254	1.151	1.152	1.164	0.000	7.115
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will deliver advanced flight controls, autonomy technologies, and new handling qualities criteria are implemented and tested in a realistic environment to demonstrate their functionality and increase their technical readiness level (TRL). This Project also delivers demonstrated and matured flight controls and autonomy technologies at TRL 6 to transition partners.

Research in this Project is fully coordinated with Program Element (PE) 0602183A (Air Platform Applied Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Adaptive Tactical Autonomy and Control (ATAC) Technology Demonstration	-	1.098	1.254
Description: Mature, integrate, and demonstrate advanced flight control technologies and state-of-the-art autonomy algorithms that provide Future Vertical Lift (FVL) aircraft with enhanced maneuverability and agility, reduced cognitive workload, improved survivability through damage tolerance, and the ability to operate on an autonomy spectrum from piloted to fully autonomous and exploit degraded environments as a force multiplier. *FY 2023 Plans:* Demonstrate advanced high-speed flight control algorithms within the flight-envelop-limits of Army flying laboratories. Demonstrate control strategies for seamless hand-off from pilot to autonomous system, and back, for optionally piloted operations. Collaborate with the original equipment manufacturers (OEM's) to mature and flight test new high-speed handling qualities criteria and Mission Task Elements (MTE). *FY 2024 Plans:* Will integrate and demonstrate autonomous obstacle field navigation enhancements, including Risk-Aware Path Planner (RAPP), on Army flying laboratories. Will integrate and demonstrate control laws for active sensing to improve the effectiveness of sensors. Will integrate and demonstrate advanced concepts for ensuring pilot awareness of autonomous system's intent. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*	**Project (Number/Name)** CV1 *I Control & Autonomy for Tactical Superiority Adv*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase in FY24 supports the implementation and flight testing of metrics and performance requirements used to develop autonomy algorithms.			
Title: SBIR/STTR Transfer	-	0.042	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	1.140	1.254

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*				**Project (Number/Name)** CV2 *I Structures Platform Int Resilience & Efficiency*			

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CV2: *Structures Platform Int Resilience & Efficiency*	-	-	3.124	3.358	-	3.358	5.138	6.549	5.148	5.204	0.000	28.521
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will ensure a continuous stream of transition-ready critical structures advanced technologies for improvement of performance (via weight efficiency and multifunctionality for parasitic weight avoidance) and resilience (survivability, sustainment, and operational availability).

Research in this Project is fully coordinated with Program element (PE) 0602183A (Air Platform Applied Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Adaptive Resilient Engineered Structures (ARES)	-	3.010	3.358

Description: Mature, integrate, and demonstrate advanced structures technologies providing performance, survivability, and sustainment benefits with broad applicability across platform scale and role, enabling mission success for manned/unmanned Future Vertical Lift (FVL) platforms in the contested environment of multi-domain operations.

FY 2023 Plans:
Further mature, test, and integrate advanced structures technologies, quantifying their contribution to improved efficiency, performance, survivability, and sustainment (reliability and availability). Leverage trade study results to design an integrated demonstration exploiting the synergy of technologies including weight-saving, fatigue-tolerant, affordable, multifunctional, and damage-tolerant configurations for primary and secondary structure.

FY 2024 Plans:
Will further mature, test, and integrate advanced structures technologies, quantifying their contribution to improved efficiency, performance, survivability, and sustainment (reliability and availability). Will use building block testing and analysis to prepare for an integrated demonstration exploiting the synergy of technologies including weight-saving, fatigue-tolerant, affordable, multifunctional, and damage-tolerant configurations for primary and secondary structure.

FY 2023 to FY 2024 Increase/Decrease Statement:

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army			**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3		**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Tech nology*	**Project (Number/Name)** CV2 *I Structures Platform Int Resilience & Efficiency*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase in FY24 supports increased building block testing to mitigate risk in the upcoming integrated demonstration.			
Title: SBIR/STTR Transfer	-	0.114	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	3.124	3.358

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*			**Project (Number/Name)** CX1 *I Advanced Rotors Advanced Tech*				

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CX1: *Advanced Rotors Advanced Tech*	-	-	2.618	2.657	-	2.657	2.684	2.687	2.689	2.718	0.000	16.053
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project investigates Future Vertical Lift (FVL) and other Army and Department of Defense (DoD) advanced drive train technologies that increase performance and double current drivetrain life cycles while improving their reliability and maintainability.

Research in this Project is fully coordinated with PE 0602183A (Air Platform Applied Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: High Speed Highly Efficient Rotors	-	2.522	-
Description: This effort demonstrates full scale, integrated rotor system technologies through the assessment of alternative designs aimed to satisfy future capability needs for aviation and FVL increased system durability, efficiency, speed, range, and payload. Potential technologies include: integrated high speed, low drag rotor technologies for high speed configurations; interactional aerodynamics tailoring between rotor and body & auxiliary lift/ propulsors; light weight, low volume, efficient and high authority electro-mechanical actuators (EMAs); reliable and robust actuators/hubs/controls for Independent Blade Control (IBC)/ swashplateless rotors; active/passive flow control; and automated track and balance. **FY 2023 Plans:** Complete fabrication of demonstration hardware. Conduct rotor blade and hub structural testing. Conduct full scale whirl test planning. **FY 2023 to FY 2024 Increase/Decrease Statement:** In FY23, this effort ends and funding is realigned to Lightweight Durable Rotor Technologies within this project.			
Title: Lightweight Durable Rotor Technologies	-	-	2.657
Description: This effort matures and demonstrates full scale, integrated durable rotor system technologies to improve rotor blade service lives and reduce maintenance costs aimed to satisfy future capability needs for aviation and FVL increased system			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*	**Project (Number/Name)** CX1 *I Advanced Rotors Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
durability, efficiency, speed, range, and payload. Potential technologies include lightweight and highly durable blade erosion protection, low power and more reliable blade deicing capability, more reliable rotor system sensors/instrumentation, reliable and durable rotor actuation, low drag/low part count hubs, and improved blade repair methodologies. ***FY 2024 Plans:*** Will test low drag, low part count rotor hub. Will screen initial durable rotor technologies as part of program kickoff planning. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This effort begins in FY24 with funding realigned from High Speed Highly Efficient Rotors within this project.			
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.096	-
Accomplishments/Planned Programs Subtotals	-	2.618	2.657

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army									Date: March 2023			
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603043A I Air Platform Advanced Technology					Project (Number/Name) CX2 I Next Generation Aviation Transmission Adv Tech			
COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CX2: Next Generation Aviation Transmission Adv Tech	-	-	4.389	-	-	-	-	-	2.638	4.373	0.000	11.400
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 24, funding is realigned from Project CX2 (Next Generation Aviation Transmission Adv Tech) to fund higher priority projects in the Army.

A. Mission Description and Budget Item Justification

This Project develops and ground demonstrates variable-speed advanced transmission technologies that can be matured and integrated into the development of Future Vertical Lift (FVL) platforms and other Army and Department of Defense (DoD) aviation systems.

Research in this Project is fully coordinated with PE 0602183A (Air Platform Applied Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: High Reduction Ratio Transmission (HRT)	-	4.229	-
Description: This effort will mature and demonstrate the technologies necessary for development, design, fabrication, and testing of a high reduction-ratio transmission in two stages or less (60:1 reduction ratio) with high efficiency and improved reliability against corrosion and seal leakage. Technology demonstrations from this effort will be applicable to FVL platforms. **FY 2023 Plans:** Perform component level fabrication, assembly, and risk reduction testing of transmission technologies that produces a 60:1 reduction ratio two-stage gearbox design for significant weight and volume reduction enabling extended range and component life while improving reliability and reducing life-cycle costs for manned and unmanned applications. **FY 2023 to FY 2024 Increase/Decrease Statement:** This effort ends in FY23.			
Title: SBIR/STTR Transfer	-	0.160	-
FY 2023 Plans:			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Tech nology*	**Project (Number/Name)** CX2 *I Next Generation Aviation Transmission Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	4.389	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603043A I Air Platform Advanced Technology						Project (Number/Name) DC3 I HPC For Army Aviation Concepts	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DC3: *HPC For Army Aviation Concepts*	-	-	5.424	5.529	-	5.529	5.587	7.607	8.851	8.986	0.000	41.984
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates the use of high-fidelity computational fluid dynamics for Future Vertical Lift (FVL) platforms through the utilization of Department of Defense (DoD) High- Performance Computing (HPC) and software tools for cutting-edge modeling and simulation, as well as adding software capabilities for workflow automation and design space exploration. Efforts in this Project are also applicable to the family of FVL and Future Tactical Unmanned Aircraft System (FTUAS) platforms.

Work in this Project complements PE 0602183A (Air Platform Applied Research).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Engineered Resilient Systems (ERS) for Army Aviation	-	2.273	-
Description: This effort supports Future Vertical Lift by exploiting advancements in physics-based software tools to provide rapid engineering analysis of proposed rotorcraft platforms, providing high-fidelity computational modeling of candidate Future Attack Reconnaissance Aircraft (FARA) platforms during the FARA down-selection, increasing the speed of simulations by automating simulation setup and execution on DoD HPC systems, and maturing and demonstrating the use of advanced machine learning techniques for aviation datasets to inform both the development of FVL systems and current operations. *FY 2023 Plans:* Provide automated tools and plugins to evaluators to support FARA / Future Long-Range Assault Platforms (FLRAA) design evaluations. Expand computational modeling and optimization efforts to include additional domains, e.g., advanced rotor blade material and acoustic considerations. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*	**Project (Number/Name)** DC3 *I HPC For Army Aviation Concepts*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding decrease reflects planned lifecycle completion of this effort with transition of automation tools and plugins to be used for Future Vertical Lift system evaluations.			
Title: Advanced Computational Technologies for Army Aviation	-	2.953	5.529
Description: This effort supports FVL by utilizing advanced computational techniques leveraging automated design processes to expand computational testbeds in support of testing and evaluation. Increase high accuracy physics in modeling and simulation to optimize platforms for all operational environments and mission scenarios. Provide multi-fidelity computational models of candidate FARA, FLRAA, and FTUAS platforms to support acquisition decision-makers. *FY 2023 Plans:* Couple engineering design evaluation with simulated mission scenario performance for mission-effectiveness design evaluation. Expand computational modeling capability to secret and/or above secured high-performance computing. Evaluate the usability of physics-informed machine learning methods and approaches to impact design and analysis of rotorcraft systems. *FY 2024 Plans:* Will mature the Decision Support Tool (DST) for executing combined engineering analysis and mission scenarios. Will demonstrate computational modeling and simulation capabilities for rotorcraft design and analysis on secret high-performance computing assets. Will expand computational modeling frameworks to include multi-fidelity computational models of candidate Future Vertical Lift (FVL) platforms. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects investments required to mature and demonstrate computational tools for secured computing environments.			
Title: SBIR/STTR Transfer	-	0.198	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	5.424	5.529

C. Other Program Funding Summary ($ in Millions)

 N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603043A *I Air Platform Advanced Technology*	**Project (Number/Name)** DC3 *I HPC For Army Aviation Concepts*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603044A *I Soldier Advanced Technology*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	0.858	0.479	1.214	-	1.214	3.913	4.158	3.951	4.497	0.000	19.070
CN8: *Soldier Enabled University Advanced Development*	-	0.858	0.479	0.587	-	0.587	2.868	2.797	2.799	2.829	0.000	13.217
CW1: *Technical-SAVVY Soldier Advanced Research*	-	-	-	0.627	-	0.627	1.045	1.361	1.152	1.668	0.000	5.853

A. Mission Description and Budget Item Justification

This Program Element (PE) matures, optimizes, and validates applied research technologies to demonstrate improved capabilities and systems that advance Soldier and Squad lethality-overmatch and Soldier performance beyond those technologies planned within the Soldier Lethality Cross-Functional Team. Advanced technology research efforts focus on the maturation and integration of broad capabilities and systems that span a range of technical areas to address enduring Soldier needs. These efforts transition outputs to existing and emerging systems in support of continuing enhancement of Soldier capabilities. This PE will fund civilian salaries for in-house researchers/scientists and program managers collaborating with external subject matter experts in academia and industry who are leaders in these technology research areas.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	0.890	0.479	1.208	-	1.208
Current President's Budget	0.858	0.479	1.214	-	1.214
Total Adjustments	-0.032	0.000	0.006	-	0.006
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.032	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.006	-	0.006

Change Summary Explanation
Increased funding due to revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603044A *I Soldier Advanced Technology*					**Project (Number/Name)** CN8 *I Soldier Enabled University Advanced Development*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CN8: *Soldier Enabled University Advanced Development*	-	0.858	0.479	0.587	-	0.587	2.868	2.797	2.799	2.829	0.000	13.217
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project leverages advanced technological innovations from academia to accelerate the optimization and demonstration of improved capabilities and systems that advance Soldier and Squad lethality-overmatch and Soldier performance and meet mission needs in the future operating environments. This Project funds collaborative, enduring advanced extramural university-based maturation and demonstration of technologies and brings together competitively selected universities with Army research teams into Technical Alliances. This Project will focus efforts on mid- to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to supporting the modernization priorities. The technical scope of this Project includes the optimization, maturation and demonstration of overarching Soldier-centric technologies including human systems integration, simplified synthetic training environments, advanced protective materials, power and energy, Warfighter endurance, robotics, as well as other innovative Soldier enabled advanced research technologies that will accelerate the Army modernization in Synthetic Training Environment, and Soldier Lethality. This Project conducts advanced research and development leading to potential emerging technologies in areas of strategic importance to the Army in Soldier capabilities related to increased protection, performance, agility, situational awareness, and lethality. This Project will also continuously strive to engage and collaborate with entities that might not otherwise collaborate with the Department of Defense (DoD) to demonstrate and provide novel Soldier-centric technologies for accelerating the adoption of emerging technologies for the Warfighter in the Army Soldier portfolio.

Work in this Project complements Program Element 0603118A (Soldier Lethality Advanced Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Soldier Performance and Training	0.574	0.462	0.587
Description: Mature and demonstrates Soldier capabilities related to increased protection, performance, agility, situational awareness, training, and lethality. **FY 2023 Plans:** Down-select, optimize, and validate with Soldier input mobile monitoring technologies, including digital/wireless biosensors, to identify conditions that might impede peak Soldier performance and enable Warfighter readiness. **FY 2024 Plans:**			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023		
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603044A / *Soldier Advanced Technology*		**Project (Number/Name)** CN8 / *Soldier Enabled University Advanced Development*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Prototype data lake environment and data ecosystem to refine the synthetic training environment data management architecture; mature and demonstrates technologies to monitor health, cognitive state and readiness of Warfighters through digital biosensors. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort with increased user feedback			
Title: Soldier Advanced Materials for the Integrated Combat Platform ***Description:*** Optimize and mature advanced materials and electronics that are standardized to the Soldier and their equipment through integrated combat platform.	0.284	-	-
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.017	-
Accomplishments/Planned Programs Subtotals	0.858	0.479	0.587

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603044A I *Soldier Advanced Technology*					Project (Number/Name) CW1 I *Technical-SAVVY Soldier Advanced Research*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CW1: *Technical-SAVVY Soldier Advanced Research*	-	-	-	0.627	-	0.627	1.045	1.361	1.152	1.668	0.000	5.853
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project CW1 (Technical-SAVVY Soldier Advanced Research) is a New Start in Fiscal Year 2024 (FY24).

A. Mission Description and Budget Item Justification

This project conducts applied technology development to provide critical breakthroughs in developing a "technologically" fluence force. This research will refine, adapt, and validate methods and measures to assess and develop the technological fluency (TF) of Soldiers across a career (TF Personnel Assessments) and technologies to maximize technological fluency resilience and performance in Soldiers and units (Maximizing TF). TF is defined as the ability of Soldier and units to use and rapidly adapt new and intelligent technologies without formal training on these technologies, and it will be a decisive factor in a future operating environment in which Soldiers and squads are teamed with increasingly sophisticated and evolving technologies. Soldiers and leaders in specialty areas (e.g., Cyber, and Emerging Tech) and general purpose forces will require increased technological aptitudes and skills to adapt emerging technologies to evolving mission sets and avoid being overmatched by Artificial Intelligence (AI)-enabled "smart" technologies.

This Project supports key Army needs and will coordinate and/or leverage findings of several PEs to include 0602184A (Soldier Applied Research), and 0603007A (Manpower, Personnel and Training Advanced Technology).

This research will be performed by the U.S. Army Research Institute (ARI) for Behavioral and Social Sciences, and in coordination with collaborative research between ARI and the Combat Capability Development Command - Army Research Laboratory (ARL) performed within 0602184A (Soldier Applied Research).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and the Army People Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Soldier Technical Enhancement Advanced Research	-	-	0.627
FY 2024 Plans: Will initiate validation of assessment instruments to assess Technological Fluency (TF) attributes. *FY 2023 to FY 2024 Increase/Decrease Statement:* This is a New Start for FY24.			
Accomplishments/Planned Programs Subtotals	-	-	0.627

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603044A *I Soldier Advanced Technology*	**Project (Number/Name)** CW1 *I Technical-SAVVY Soldier Advanced Research*

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

PE 0603044A: *Soldier Advanced Technology*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*						**R-1 Program Element (Number/Name)** PE 0603115A *I Medical Development*						
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	25.540	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.540
EB3: *HIV Medical Development*	-	25.540	-	-	-	-	-	-	-	-	0.000	25.540

A. Mission Description and Budget Item Justification

This Program Element (PE) funds the Military Human Immunodeficiency Virus (HIV) Research Program and the following medical research efforts: Walter Reed Army Institute of Research (WRAIR) Vaccine Production research, Underbody Blast (UBB) research, and Deployed Warfighter Protection. Funding also supports the Medical Operational Data System (MODS), Pharmacovigilance Defense Application System (PVDAS), Mobile HealthCare Environment (MHCE), and the Civilian Authorized Salaries and Other Operational Requirements programs.

The Military HIV Program supports the research and development to develop candidate HIV vaccines, to assess safety and effectiveness in human subjects and to protect military personnel from risks associated with HIV infection.

The WRAIR Vaccine Production Facility research Project supports the development and licensure of vaccines and relevant biologics critical to the global health of our Warfighters serving domestically or abroad in compliance with Food and Drug Administration (FDA) regulations.

The UBB Testing medical research Project provides funds to establish a scientific and statistical basis for evaluating skeletal injuries to vehicle occupants during ground vehicle UBB events. Areas of interest to the Secretary of Defense are medical research that provides an understanding of the human response and tolerance limits and injury mechanisms needed to accurately predict skeletal injuries to ground combat vehicle occupants caused by UBB events. This enhanced understanding will support the establishment of an improved capability to conduct Title 10 Live Fire Test and Evaluation and to make acquisition decisions.

The Deployed Warfighter Protection program Armed Forces Pest Management Board provides for the development of new or improved protection of military personnel from insects and tick vectors of disease pathogens.

The MODS, PPVDAS, and MHCE identify, explore and demonstrate key technologies to overcome medical and military unique technology barriers.

The Civilian Authorized Salaries and other operational requirements provide funding for authorized civilian workforce performing medical research, development, acquisition management and oversight that support the medical research, development, test, and evaluation (RDTE) programs at the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, Maryland.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			**Date:** March 2023		
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603115A *I Medical Development*		

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	26.508	0.000	0.000	-	0.000
Current President's Budget	25.540	0.000	0.000	-	0.000
Total Adjustments	-0.968	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.968	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603115A / *Medical Development*				**Project (Number/Name)** EB3 / *HIV Medical Development*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
EB3: *HIV Medical Development*	-	25.540	-	-	-	-	-	-	-	-	0.000	25.540
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Military Human Immunodeficiency Virus (HIV) Research Program develops vaccine candidates, to assess their safety and effectiveness in human subjects, and to protect military personnel from risks associated with HIV infection. All HIV technology development is conducted in compliance with United States Food and Drug Administration (FDA) regulations. This program is jointly managed through an Interagency Agreement between the United States Army Medical Research and Development Command (USAMRDC) and the National Institute of Allergy and Infectious Diseases. The cited work is also consistent with the Under Secretary of Defense, Research and Engineering Science and Technology focus areas.

The Walter Reed Army Institute of Research (WRAIR) Vaccine Pilot Bioproduction Facility (PBF) is the Department of Defense (DOD) only facility capable of producing good manufacturing practices (GMP) quality biologic products for use in early phase clinical trials. The mission of the WRAIR PBF is to support the development and licensure of vaccines and relevant biologics critical to the global health of our Warfighters serving domestically or abroad in compliance with United States FDA regulations. This project supports vaccine development efforts of strategic importance to the DoD, including Service medical research and development programs, those of other DoD organization such as the Defense Threat Reduction Agency and the Defense Advanced Research Projects Agency, and pandemic bio preparedness for emerging infectious disease threats in the Global Health Security Agenda.

The Underbody Blast (UBB) Testing medical research project will provide new data on the biomechanics of human skeletal response that occurs in an attack on a ground combat vehicle, it will provide better protection to mounted warriors from the effects of underbody blast caused by landmines or improvised explosive devices (IEDs). The data will provide a biomedical basis for the development of a Warrior-representative blast test manikin (the Warrior Injury Assessment Manikin or WIAMan project) and the required biomedically-valid injury criteria that can be used in Title 10 Live Fire Test and Evaluation (LFT&E) to characterize dynamic events, the risk of injury to mounted warriors, and to support acquisition decisions. The data produced by this project will be used to satisfy a critical need for a scientifically valid capability for analyzing the risk of injury caused by UBB.

The Deployed Warfighter Protection project, the Armed Forces Pest Management Board (AFPMB), plans to develop new or improved protection for ground forces from disease-carrying insects. The focus of this program is to develop new or improved systems for controlling insects that transmit malaria, dengue, chikungunya and other emerging infectious diseases under austere, remote, and combat conditions; understand the physiology of insecticidal activity to develop new compounds with greater specific activity and/or higher user acceptability; examine existing area repellents for efficacy and develop new spatially effective repellent systems useful in military situations; develop new methods or formulations for treating cloth to prevent vector biting; and expand the number of active ingredients and formulations of public health pest pesticides, products and application technologies available for safe, and effective applications. The AFPMB partners with the President's Malaria Initiative and the World Health Organization Global Malaria Program to lead development of new tools for insect-borne disease prevention.

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603115A *I Medical Development*	**Project (Number/Name)** EB3 *I HIV Medical Development*

The Medical Operational Data System (MODS) deploys modernized data visualization capabilities to enhance Army Unit and Individual Medical Readiness Reporting. MODS provides Army leadership with a responsive and reliable human resource and readiness information management data system for all categories of military and civilian medical and support personnel. MODS provide Tri-Service support through applications such as Electronic Profile, Behavioral Health, and Medical Education.

The Pharmacovigilance Defense Application System (PVDAS) provides military providers Defense Patient Safety reports from the FDA after a drug's release to market. The program identifies, explores, and demonstrates key information technologies to overcome medical and military unique technology barriers.

The Mobile HealthCare Environment (MHCE) is the capability of secure, bidirectional messaging and data exchange between patients, providers and clinics using any electronic device. The program identifies, explores, and demonstrates key information technologies to overcome medical and military unique technology barriers.

The Civilian Authorized Salaries and Other Operational requirements provide funding for authorized civilian workforce performing medical research, development, acquisition management and oversight that support the medical research, development, test, and evaluation (RDTE) programs at the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, Maryland.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: HIV Medical Development *Description:* The Military HIV Research Program aims to mature candidate HIV vaccines, to validate their safety and effectiveness in human subjects, and to protect the military personnel from risks associated with HIV infection. These activities also include development of monoclonal antibody candidates to address HIV risk to the blood supply in large scale combat operations This project determines one or more prevention countermeasure candidates that are optimized through pre-clinical down-selection studies in large animal models and conducts human clinical trials in Africa, Asia and the United States to test for safety and immunogenicity (ability to invoke an immune response), and contributes to early proof of concept efficacy testing.	7.833	-	-
Title: WRAIR Vaccine Production Facility Research *Description:* The WRAIR Vaccine Pilot Bioproduction Facility (PBF) will focus on advanced technology development and transition through production of early phase (1/2a) clinical materials from varied platforms, such as live virus, conjugates, recombinant proteins, monoclonal antibodies, Ribonucleic Acid (RNA) and deoxyribonucleic acid (DNA) approaches that: (a) expand collaborative partnerships for product development that meet DoD requirements; (b) open active intramural-based discovery efforts of new products for development; and (c) initiate and extend strategic partnerships with external collaborators (Government and industry) to develop/co-develop potential new biologic approaches to pandemic disease preparedness.	8.107	-	-
Title: Deployed Warfighter Protection *Description:* The Deployed Warfighter Protection program will mature new or improved tools to protect deployed forces from disease-carrying insects and ticks.	6.303	-	-
Title: Medical Operational Data System	1.909	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603115A / *Medical Development*	**Project (Number/Name)** EB3 / *HIV Medical Development*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: The Medical Operational Data System is the Army's authoritative data source for Individual Medical Readiness (IMR) reporting, and supports Army Global Medical Force Readiness (GMFR) to include the Army Surgeon General Title X responsibilities to recruit, retain, pay and train the Army Medical Force.			
Title: Pharmacovigilance Defense Application System	0.304	-	-
Description: The PVDAS provides military providers Defense Patient Safety reports from the FDA after a drug's release to market.			
Title: Mobile Health Care Environment	0.331	-	-
Description: The Mobile HealthCare Environment matures and demonstrates technologies to support the capability of secure, bidirectional messaging and data exchange between patients, providers and clinics using any electronic device.			
Title: Civilian Authorized Salaries and Other Operational Requirements	0.753	-	-
Description: Funding is provided to the USAMRDC for Medical Research Development Acquisition (RDA) Management and Oversight to include the payroll of civilians as well as nominal operating expense			
Accomplishments/Planned Programs Subtotals	25.540	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*						
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	7.772	9.796	20.582	-	20.582	22.485	19.793	10.459	11.223	0.000	102.110
CG2: *Lethality Enabling University Adv Development*	-	6.727	7.653	8.594	-	8.594	8.125	8.572	8.578	8.672	0.000	56.921
CH5: *Terminal Effects Against Critical Targets Adv Tech*	-	1.045	2.143	4.020	-	4.020	5.168	1.033	1.881	2.551	0.000	17.841
CID: *Sensor to Shooter (STS) Advanced Technology*	-	-	-	5.655	-	5.655	-	-	-	-	0.000	5.655
DB2: *Future Armaments Scalable Technologies*	-	-	-	2.313	-	2.313	9.192	10.188	-	-	0.000	21.693

A. Mission Description and Budget Item Justification

Work done in this Program Element (PE) matures technologies, methodologies, and models required to enable next generation lethality. The PE focuses on: lethal mechanism technologies for projectiles and warheads that provide revolutionary capability to defeat Tier 1 adversary vehicle and body armors; selection of propulsion and energetic materials and technology to validate novel energetic materials concepts to exploit controllable energy release for future gun/missile systems; scalable effects for mixed target defeat while simultaneously decreasing warhead mass; experimentation of materials solutions for improvement of weight and volume efficiency, lethal effects and sustainability for the warfighter in the Army of today and beyond; and multiple pathways to enhance lethal effects by investigating synergistic effects of novel micro warheads using advanced materials.

This PE continues to mature and demonstrate technology developed under PE 0602141A (Lethality Technology).

Work in this PE complements PE 0603118A (Soldier Lethality Advanced Technology), PE 0603462A (Next Generation Combat Vehicle Advanced Technology), PE 0603464A (Long Range Precision Fires Advanced Technology), 0603465A (Future Vertical Lift Advanced Technology), and 0603466A (Air and Missile Defense Advanced Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this PE is performed by the United States (US) Army Futures Command (AFC) and US Army Engineer Research and Development Center (ERDC).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*		

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	8.066	9.796	14.361	-	14.361
Current President's Budget	7.772	9.796	20.582	-	20.582
Total Adjustments	-0.294	0.000	6.221	-	6.221
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.294	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	6.221	-	6.221

Change Summary Explanation

Funding increase will mature networked lethality architecture to enable automated targeting for rapid engagement; mature digital collaborative targeting capabilities, fires planning and de-confliction tools, and coordination and delivery algorithms to reduce sensor to shooter timelines.

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	

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R-1 Program Element (Number/Name)
PE 0603116A *I Lethality Advanced Technology*

Project (Number/Name)
CG2 *I Lethality Enabling University Adv Development*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CG2: *Lethality Enabling University Adv Development*	-	6.727	7.653	8.594	-	8.594	8.125	8.572	8.578	8.672	0.000	56.921
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project leverages advanced developments and technological innovations from academia, of lethal directed energy, laser diagnostics and accelerated design of future hypersonics and their scramjet engine combustion, deep learning and novel materials of importance to the Army, by maturing developments and performs demonstrations focused on getting technology to the warfighter more quickly. This Project exploits advanced research and development efforts to focus more on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to the Long Range Precision Fires and Air and Missile Defense. This Project focuses on maturation and demonstration of various advanced technologies originating from extramural applied research in academia pertaining to lethal directed energy, laser diagnostics, future hypersonic glide body and scramjet propulsor design, deep learning, novel materials, and expansion of the Ballistic, Aero-Optics and Materials (B.A.M.) range applied to lethality. This effort validates advanced research and performs demonstrations leading to potential emerging technologies in areas of strategic importance to the Army in directed energy, future hypersonic glide body design, deep learning and novel materials, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances.

Work in this Project complements Program Element (PE) 0620141A (Lethality Technology), PE 0602147A (Long Range Precision Fires), PE 0603464A (Long Range Precision Fires Advanced Technology), and PE 0603466A (Air and Missile Defense Advanced Technology)

The work cited is consistent with Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Laser Diagnostics for Hypersonics and Directed Energy	2.144	2.208	2.469
Description: This effort matures laser diagnostics to assess turbulence and boundary layer transition, leading to validation of hypersonic flight models and enhanced directed energy system effectiveness and range through improved targeting, prediction and beam control. *FY 2023 Plans:*			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*	**Project (Number/Name)** CG2 *I Lethality Enabling University Adv Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will continue to mature a suite of laser diagnostics for hypersonic ground testing and models to predict effects of atmospheric turbulence on laser propagation. Develop capabilities to capture time volumetric gas density hypersonic flow imagery. Advanced development to inform the expansion of the BAM range for testing and evaluation of hypersonic and directed energy systems. ***FY 2024 Plans:*** Will continue to improve and validate models for directed energy system effectiveness. Mature and demonstrate methods of sensing for hypersonic ground test and flight applications and for the measurement of turbulent aero-optical environments. Validate and optimize models from results of experimentation in the Ballistic Aero-Optics and Materials (B.A.M.) and other test facilities. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Title: Turbulence and Transition Modeling and Validation for Hypersonic Vehicles ***Description:*** This effort matures modeling turbulence and transition for hypersonic vehicles to accelerate design of future hypersonic glide bodies and systems through modeling and sub scale testing. ***FY 2023 Plans:*** Will continue to accelerate and mature the design and advancement of hypersonic glide bodies and systems through turbulence and transition modeling. Will mature boundary layer transition code development. Reduce flight test risk through modeling and sub scale wind tunnel testing of effects of new design features. Advanced development to inform the expansion of the Ballistic, Aero-Optics and Materials (B.A.M.) range for testing and evaluation of aerothermodynamic performance at hypersonic speeds. ***FY 2024 Plans:*** Continue to improve and provide computational fluid dynamics high performance computing models for transition, and turbulence models to improve hypersonic investigations and improve the rate of hypersonic vehicle design. Conduct validation experiments across multiple types of hypersonic test tunnels. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.	2.789	2.439	3.039
Title: Novel Materials for Extreme Environments ***Description:*** This effort matures and validates computational and multiscale models of high strain rate materials to mitigate the effects of hypervelocity impacts (HVIs) and offer thermal protection. ***FY 2023 Plans:***	0.737	0.800	0.932

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*	**Project (Number/Name)** CG2 *I Lethality Enabling University Adv Development*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will continue to mature and validate critical high temperature materials and characterization testing and analysis capability for the design of thermal protection systems to defeat emerging threats from hypersonic weapons. Mature numerical algorithms of select materials. Provide protection overmatch from high kinetic energy impacts through material layering and unique structures. *FY 2024 Plans:* Will continue to mature and improve characterization and materials for extremely high temperature applications. Will demonstrate an accelerated discovery approach for selecting high entropy materials for extreme environments. Will mature and demonstrate novel coatings as thermal protection systems. Will validate techniques and performance of composite joining materials and their multi-physics models. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: Intelligent Hypersonics and Other Missile Defense Systems *Description:* This effort matures and validates hypersonic vehicle flight systems with deep learning neural networks that can adapt to changing conditions and become more lethal. Integration of air and missile defense (AMD) command and control (C2) systems and their instrumentation, simulation, and stimulation. *FY 2023 Plans:* Will validate ablation characteristics and the semi-autonomous synthetic flight control systems performance utilizing machine learning and deep neural network tools for hypersonic vehicle geometries. Will fabricate and mature axisymmetric prototype scramjet propulsor with transpiration fuel delivery system for high-speed projectiles. Will integrate robust and extensible instrumentation, simulation, and stimulation prototype capability for prototype development, and operational testing of AMD C2 systems. *FY 2024 Plans:* Will continue to validate ablation characteristics and the semi-autonomous synthetic flight control system's performance and vehicle self-health monitoring sensors. Will continue to mature, integrate and demonstrate instrumentation, simulation, and stimulation of air and missile defense (AMD) C2 systems. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.	1.057	1.927	2.154
Title: SBIR/STTR Transfer *FY 2023 Plans:*	-	0.279	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*	**Project (Number/Name)** CG2 *I Lethality Enabling University Adv Development*		

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	6.727	7.653	8.594

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army									**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*				**Project (Number/Name)** CH5 *I Terminal Effects Against Critical Targets Adv Tech*		

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CH5: *Terminal Effects Against Critical Targets Adv Tech*	-	1.045	2.143	4.020	-	4.020	5.168	1.033	1.881	2.551	0.000	17.841
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates engineering tools and high-fidelity modeling and simulation capabilities to predict and optimize weapon performance to ensure lethality against structures and critical assets. This project provides validated engineering tools and technologies to rapidly evaluate and predict weapon performance.

Work in this Project complements PE 0602141A (Lethality Technology) / Project CF8 (Terminal Effects Against Critical Targets Tech).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Advanced Terminal Effects Demonstration *Description:* Demonstrates and provides a predictive capability for terminal effects and lethality and a fast running engineering tool to support Long Range Precision Fires (LRPF) weaponeering on critical structural and geological targets of interest. *FY 2023 Plans:* Demonstrate and provide high fidelity and fast-running runway cratering tools for damage prediction of Army Fires munitions; and provide and integrate steel penetration algorithms for army munitions on critical target sets into weapon effects code. *FY 2024 Plans:* Will demonstrate combined blast/frag/structural models in BlastX tool, will validate PENFRAG Code for prediction and analysis of munition fragment and small caliber penetration, will demonstrate PENCURV+ updates for advanced penetration prediction and analysis capabilities. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects investments required to validate and demonstrate predictive software tools requiring fragmentation and penetration physical testing.	1.045	2.086	4.020
Title: SBIR/STTR Transfer	-	0.057	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*	**Project (Number/Name)** CH5 *I Terminal Effects Against Critical Targets Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	1.045	2.143	4.020

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*					**Project (Number/Name)** CID *I Sensor to Shooter (STS) Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CID: *Sensor to Shooter (STS) Advanced Technology*	-	-	-	5.655	-	5.655	-	-	-	-	0.000	5.655
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Sensor to Shooter (STS) Advanced Technology is a new start within the Lethality Advanced Technology program in FY 2024.

Funding in FY24 is realigned from PE 0603041A / Project CM8 (Convergence Battlefield Integration).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates an advanced network lethality architecture to enable Joint All Domain Command and Control decision aid algorithms for coordinated and synchronized response and incorporates a full spectrum of effects and scalability to reduce the sensor to shooter timeline for Large Scale Combat Operations in a multi-domain environment.

Work in this Project is done in coordination with Program Element (PE) 0602181A (All Domain Convergence Applied Research).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports Next Generation Combat Vehicle, Tactical Network, Future Vertical Lift, and Long-Range Precision Fires Army Modernization Priorities.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Lethal Effects Architecture for Decision Synchronization Advanced Technology	-	-	5.655
Description: This effort demonstrates an enhanced decision aid architecture to automate synchronized effects, improve sensor to shooter interaction, and optimize threat engagement in support of Large-Scale Combat Operations in a joint all-domain command and control environment. *FY 2024 Plans:* Will mature networked lethality architecture to enable automated targeting for rapid engagement; mature digital collaborative targeting capabilities, fires planning and de-confliction tools, and coordination and delivery algorithms to reduce sensor to shooter timelines; mature disparate joint effects across domains in support of future large scale combat operations and multi-			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603116A / *Lethality Advanced Technology*	**Project (Number/Name)** CID / *Sensor to Shooter (STS) Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
domain operations; mature sensor to shooter decision aid algorithms to incorporate multi-domain effects into decision aid recommendations; mature decision aid algorithms to allow for scalability and increased number of weapons and targets. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This effort begins in FY24 with funding realigned from PE 0603041A / Project CM8 (Convergence Battlefield Integration).			
Accomplishments/Planned Programs Subtotals	-	-	5.655

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*					**Project (Number/Name)** DB2 *I Future Armaments Scalable Technologies*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
DB2: *Future Armaments Scalable Technologies*	-	-	-	2.313	-	2.313	9.192	10.188	-	-	0.000	21.693
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Future Armaments Scalable Technologies is a new start within the Lethality Advanced Technology program in FY 2024.

This program is a new start in FY 2024 and was realigned from PE 603465A / Project AK7 Adv Rotorcraft Armaments Protection Sys Adv Tech.

A. Mission Description and Budget Item Justification

Future Armaments Scalable Technologies addresses the need to enhance the capability of existing and future critical enabling technologies. This effort will mature critical armament component technologies in the areas of energetics & warheads, fuzing & sensing, guidance navigation and control (GNC), materials & structures in order to support critical technology insertions into program requirements.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Future Armaments Scalable Technology	-	-	2.313
Description: This effort will mature and demonstrate armament sub-components to improve end item performance of critical enabling technologies. ***FY 2024 Plans:*** Will mature novel energetic and electronic critical sub-component armament technologies for future integration into munitions and armament systems technology insertion. Will mature gun launched fuzing and sensing components, energetics, and advanced materials for future munition and weapon system capabilities that can survive extreme environments. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This is a New Start in FY24			
Accomplishments/Planned Programs Subtotals	-	-	2.313

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603116A *I Lethality Advanced Technology*	**Project (Number/Name)** DB2 *I Future Armaments Scalable Technologies*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	

| **Appropriation/Budget Activity** 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)* | | | | | **R-1 Program Element (Number/Name)** PE 0603117A *I Army Advanced Technology Development* | | | | | | |

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	76.815	134.874	136.280	-	136.280	164.254	92.976	72.737	73.154	0.000	751.090
BS2: *Army Advanced Technology Development*	-	76.815	134.874	136.280	-	136.280	164.254	92.976	72.737	73.154	0.000	751.090

A. Mission Description and Budget Item Justification

The Army Advanced Technology Development budget line includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

Efforts develop proof of technological feasibility and assessment of subsystem and component operability that may lead to full system development and prototyping.

B. Program Change Summary ($ in Millions)

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	76.815	134.874	141.342	-	141.342
Current President's Budget	76.815	134.874	136.280	-	136.280
Total Adjustments	0.000	0.000	-5.062	-	-5.062
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-5.062	-	-5.062

Change Summary Explanation

Decrease in funding to support higher priorities within the Science & Technology (S&T) portfolio.

PE 0603117A: *Army Advanced Technology Development*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*						
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	148.458	154.639	102.778	-	102.778	102.970	124.646	135.633	138.518	0.000	907.642
AY5: *Soldier Squad Small Arms Armaments Advanced Tech*	-	11.029	6.516	6.651	-	6.651	7.966	10.870	10.879	10.956	0.000	64.867
AY7: *Small Arms Fire Control Advanced Technology*	-	12.616	3.066	2.575	-	2.575	-	-	-	-	0.000	18.257
AY9: *Body Armor & Integrated Headborne Advanced Tech*	-	7.422	8.097	8.247	-	8.247	10.726	10.658	8.160	8.274	0.000	61.584
AZ6: *Soldier Signature Management Advanced Technology*	-	2.861	3.084	3.130	-	3.130	3.149	3.152	3.155	3.189	0.000	21.720
BB3: *Dismounted Soldier Survivability Equip/Tech Integ*	-	2.915	3.458	3.538	-	3.538	3.538	3.542	3.544	3.583	0.000	24.118
BB8: *Soldier Centric Advanced Technology*	-	5.099	2.391	1.888	-	1.888	-	-	-	-	0.000	9.378
BC1: *Human Performance AdvTech for Mobility & Lethality*	-	13.433	9.415	7.017	-	7.017	7.415	17.346	24.359	26.062	0.000	105.047
BC8: *Training Advanced Technology (Other than STE)*	-	2.884	7.078	7.684	-	7.684	10.347	24.401	32.458	32.802	0.000	117.654
BC9: *Adv Soldier Sensors/ Displays AdvTech for Dismounts*	-	12.671	25.963	27.160	-	27.160	26.756	28.610	29.152	29.470	0.000	179.782
BD7: *Soldier Sys Interfaces/ Integration-Sensor AdvTech*	-	8.068	8.504	7.931	-	7.931	8.638	9.372	9.378	9.480	0.000	61.371
BD9: *Soldier & Sm Unit Tactical Energy AdvTech*	-	3.055	4.189	9.310	-	9.310	7.562	6.560	5.054	5.104	0.000	40.834
BE2: *Joint Service Combat Feeding Advanced Technology*	-	2.335	1.988	2.673	-	2.673	2.673	2.781	2.136	2.159	0.000	16.745
BE5: *Personnel & Airdrop Safety Advanced Technology*	-	6.628	6.484	6.632	-	6.632	6.705	7.354	7.358	7.439	0.000	48.600
BE9: *STE Advanced Technology*	-	12.942	10.656	8.342	-	8.342	7.495	-	-	-	0.000	39.435

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*				**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*								
BS8: *Soldier Lethality Advanced Technology*	-	44.500	53.750	-	-	-	-	-	-	-	0.000	98.250

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates Soldier Lethality technologies that improve Soldier operational performance by increasing lethality, mobility, protection, and optimizing situational awareness across the spectrum of operating environments and missions. This PE matures Soldier weapons and enabling components / subsystems, demonstrates lethal weapons systems with potential to provide greater lethality, target acquisition, fire control, and range at a significantly reduced weight for optimized Soldier and Small Unit system performance. The major focus areas for Soldier Lethality Science and Technology are Soldier weapons and ammunition technologies, protection technologies, cognitive and physical performance measures, training in synthetic training environments, and mission support capabilities such as situational awareness sensors and displays, dismounted power and energy technologies, and Soldier and Small Unit sustainment capabilities. This technology diverse PE also matures and demonstrates sensor technologies that increase Warfighter situational understanding, survivability, and lethality by providing sensor capabilities to acquire and engage all targets and threats at longer ranges in complex environments and operational conditions (e.g. day/night, obscured, smoke, adverse weather, and other degraded visual environments), and for advancing live training technologies that accurately replicate and realistically represent the effects of current and future weapons systems during force-on-force and force-on-target training. This PE matures and demonstrates effective technology in personal combat clothing, protective equipment such as personal armor, helmets, and eyewear, combat rations, shelters, logistical support items for aerial delivery of personnel and cargo, and energy systems to power current and emerging Soldier-born Intelligence, Surveillance, and Reconnaissance (ISR), sensor, optical, and communication systems with the least weight and sustainment burden on the Soldiers and Small Combat Units. This PE also matures and demonstrates technologies supporting the Army's Synthetic Training Environment (STE), a single, interconnected synthetic training system that will enable Army units and leaders to conduct realistic multi-echelon / multi-domain combined arms maneuver and mission command training, increasing proficiency through repetition. A specific research thrust area is applying systems-based practices to mature and demonstrate scientific and tailored knowledge of Soldiers' physical and cognitive architecture to facilitate rapid and efficient designs, assessments and trade-off analyses of technology insertions on the Soldier. Significant science and technology (S&T) investments are directed to improve the effectiveness of the technologies a Soldier utilizes while reducing the size and weight of the form factor of the equipment.

Research in this PE complements PE 0602143A (Soldier Lethality Technology).

This PE is directly aligned to the Soldier Lethality and STE Modernization Priorities.

Research in this Project is performed by the United States Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*		

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	152.369	100.935	92.336	-	92.336
Current President's Budget	148.458	154.639	102.778	-	102.778
Total Adjustments	-3.911	53.704	10.442	-	10.442
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	53.750			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.911	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	10.442	-	10.442
• FFRDC Transfer	-	-0.046	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: BS8: *Soldier Lethality Advanced Technology*		
Congressional Add: *Program Increase - Advanced AI/AA Analytics for Modernization and Readiness*	10.000	-
Congressional Add: *Program Increase - Small Arms Fire Control Advanced Technology*	8.000	4.500
Congressional Add: *Ferrium Steel for Improved Personal Protective Equipment*	5.000	-
Congressional Add: *Human Machine Teaming*	4.000	-
Congressional Add: *Impact Attenuation Materials for Limb Protection*	1.500	-
Congressional Add: *Soldier Situational Awareness*	8.000	-
Congressional Add: *Squad Operations Advanced Resupply*	8.000	-
Congressional Add: *Program Increase - ADVANCED TECHNOLOGY DEVELOPMENT FOR MDO TO SUPPORT SOLDIER LETHALITY*	-	15.000
Congressional Add: *Program Increase - HMD RISK REDUCTION FOR IVAS FUTURES*	-	5.000
Congressional Add: *Program Increase - HYPER ENABLED SOLDIER LETHALITY*	-	10.000
Congressional Add: *Program Increase - HYPERSONIC WEAPON DEVELOPMENT SOFTWARE*	-	2.000
Congressional Add: *Program Increase - SHOCK ATTENUATION AND BLUNT FORCE TRAUMA IMPROVEMENTS IN HEADBORNE*	-	5.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Congressional Add: *Program Increase - SPECTROSCOPY DEVICES FOR CHEM BIO DETECTION AND DEACTIVATION WITH UV-C*	-	11.250
Congressional Add: *Program Increase - Improvements to Arctic Heaters for Tents and Shelters*	-	1.000
Congressional Add Subtotals for Project: BS8	44.500	53.750
Congressional Add Totals for all Projects	44.500	53.750

Change Summary Explanation

Funding increase will focus on soldier power and energy supply resiliency and advanced soldier sensor displays including integrated headborne sensors with preemptive threat detection.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*					**Project (Number/Name)** AY5 *I Soldier Squad Small Arms Armaments Advanced Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AY5: *Soldier Squad Small Arms Armaments Advanced Tech*	-	11.029	6.516	6.651	-	6.651	7.966	10.870	10.879	10.956	0.000	64.867
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates individual and crew-served weapon designs and technologies that enhance the fighting capabilities and survivability of the dismounted Warfighter in support of the Army's Soldier Lethality Modernization priority and all of the Services. All work is led by the Joint Service Small Arms Program (JSSAP) and is based upon the Joint Service Small Arms Master Plan (JSSAMP) and the Joint Capabilities Integration Development System's Small Arms Analyses.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

This Project complements work done in Program Element (PE) 0602143A (Soldier Lethality Technology) / AY6 (Soldier Squad Small Arms Armaments Technology).

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Small Arms Technology Demonstration	4.720	6.417	6.651
Description: This effort matures and demonstrates advanced small arms ammunition, enablers, and weapon system technologies for integration into live fire demonstrations. It refines and optimizes weapon system integration and supports the Joint Warfighters' small arms capability needs. The effort validates small arms weapon system technology readiness levels and confidence of design functionality in advanced and emerging operating scenarios. **FY 2023 Plans:** Will validate small arms system/subsystem models in relevant environments to ensure optimal performance against relevant targets; optimize automated target recognition and engagement technologies, signature reduction devices, and technologies and evaluations for legacy and next generation weapons; improve performance of: ammunition for novel targets; augmented weapon system controllability and maintainability, and advanced optical systems with machine learning algorithms; demonstrate potential technology insertions into current and emerging systems identified by the Joint Warfighter. **FY 2024 Plans:** Will?demonstrate future small arms concepts to enable a more efficient, effective, and lethal Joint?Warfighter. Will mature weapon and munition prototypes to improve small arms system performance against future targets in relevant environments. Will validate			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** AY5 *I Soldier Squad Small Arms Armaments Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
signature reduction devices and automated target recognition technologies for fielded and next generation weapons. Will mature hardware, software, and algorithms to improve small arms fire control targeting and precision. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Next Generation Family of Ammo ***Description:*** This effort matures and demonstrates the next generation of small arms live training ammunition by optimizing it through integration into new weapon systems that will provide an increased level of lethality.	6.309	-	-
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.099	-
Accomplishments/Planned Programs Subtotals	11.029	6.516	6.651

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*					**Project (Number/Name)** AY7 *I Small Arms Fire Control Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AY7: *Small Arms Fire Control Advanced Technology*	-	12.616	3.066	2.575	-	2.575	-	-	-	-	0.000	18.257
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates fire control and targeting sensor technologies and techniques to improve targeting and lethality in order to maintain overmatch at longer ranges in all operational environments and to meet the capability needs of Army Science and Technology Soldier Lethality, Next Generation Combat Vehicle, and Long Range Precision Fires modernization priorities.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

This Project complements work done in Program Element (PE) 0602143A (Soldier Lethality Technology) / AY8 (Small Arms Fire Control Technology).

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Small Arms Fire Control Advanced Technology	11.310	-	-
Description: This effort will mature and demonstrate fire control and targeting sensor technologies and techniques to improve targeting and lethality, and maintain overmatch at longer ranges in all environments.			
Title: Advanced Fire Control Tech	1.306	2.954	2.575
Description: This effort will mature and demonstrate fire control and targeting sensor technologies and techniques to improve targeting and lethality, and maintain overmatch at longer ranges in all environments. *FY 2023 Plans:* Mature machine vision databases for target recognition, to include optimization for dismounted weapon identification; validate approach for demonstration of platform architecture; improve internal communication to include the use of open source standards; demonstrate integration of augmented reality and polymer optic components for future live fire capability demonstration. *FY 2024 Plans:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** AY7 *I Small Arms Fire Control Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will mature common fire control system interfaces and architecture. Will mature advanced target recognition and tracking for static and dynamic partially obscured objects. Will improve small arms precision while reducing target engagement time. Will validate the integration of shooter aim augmentation devices. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.112	-
Accomplishments/Planned Programs Subtotals	12.616	3.066	2.575

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*					**Project (Number/Name)** AY9 I *Body Armor & Integrated Headborne Advanced Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AY9: *Body Armor & Integrated Headborne Advanced Tech*	-	7.422	8.097	8.247	-	8.247	10.726	10.658	8.160	8.274	0.000	61.584
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates body armor weight reductions and improves the performance of personal protection and survivability equipment. It also demonstrates combat helmet ballistic, blast, and small arms protection performance enhancements and the integration and optimization of power, energy, and digital sensor and display headborne technologies.

This Project supports Force Protection capability demonstrations for Soldiers and Small Units and demonstrated technologies from this effort transition to various Program Executive Office (PEO) Soldier programs.

This Project complements work done in Program Element (PE) 0602143A (Soldier Lethality Technology) / AZ2 (Body Armor & Integrated Headborne Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Body Armor and Integrated Headborne Advanced Technology **Description:** This effort focuses on maturing, integrating and demonstrating personal protective capabilities against ballistic, blast, and directed energy threats as well as the development and demonstration of Soldier worn platform architectures to optimize the integration of personal protective equipment and Soldier lethality enabling technologies. Demonstrates advanced test methods to validate personal protective equipment performance enhancements against current and emerging small arms, fragmentation, and blast threats from anti-personnel munitions. The objective of these technology development efforts is to significantly increase Soldier lethality by enhancing the protective capabilities and reducing sub-system and system-level weight of individual protective equipment to reduce the Soldier burden and increase survivability. **FY 2023 Plans:** Mature designs for personnel body armor against classified small arms threat that increase body armor protection capabilities without increasing the weight of armor material required; exploit anti-personnel munitions to characterize Soldier survivability against near-peer munition capabilities to further the optimization of personal body armor against high energy fragmenting	7.422	7.915	8.247

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** AY9 / *Body Armor & Integrated Headborne Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
munitions; mature novel fabric constructions integrated in the Soldier combat protective ensemble for ballistic protection; mature power and data interface architectures for combat helmets to develop common interface design standards for Soldier headborne technology; optimize the integration of communication headset subsystems with wireless down links to the individual radio and demonstrate enhanced audio capabilities to provide hearing protection and situational awareness cues; demonstrate integrated eye protection capability with enhanced fragmentation performance and situational awareness. *FY 2024 Plans:* Will optimize a standalone multi-threat plate designed to provide protection against multiple small arms threats without increasing the weight of armor material; mature modular and lightweight fragmentation protection garments for vulnerable or under protected regions of the body; ; demonstrate significant weight and bulk reductions of personnel body armor within the Soldier ensemble in support of the Combat Protective Ensemble (CAPE) program (PE 0603118A / Soldier Lethality Advanced Technology);demonstrate power and data interface architectures for combat helmets; to develop common interface designs;; Exploit novel and emerging helmet shell pre-forming and molding techniques to improve helmet performance; Improve mechanical and electrical integration of cable-free communication headset subsystems with wireless down links;; provide integrated eye protection with enhanced fragmentation performance and active anti-fog capability. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.182	-
Accomplishments/Planned Programs Subtotals	7.422	8.097	8.247

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*				**Project (Number/Name)** AZ6 I *Soldier Signature Management Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AZ6: *Soldier Signature Management Advanced Technology*	-	2.861	3.084	3.130	-	3.130	3.149	3.152	3.155	3.189	0.000	21.720
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project optimizes, matures and demonstrates advances in novel materials, technologies, techniques, and applications increasing the capabilities of camouflage, concealment, and deception against known and emerging sensor threats. These technologies will produce proof of concept systems that decrease the probability of detection and targeting by peer and near-peer adversaries, enabling freedom of movement of semi-independent and dispersed formations, and increase protection of high-valued assets. This Project will demonstrate disruptive Camouflage, Concealment and Deception technologies, supporting expeditionary maneuver in the Multi-Domain Battle Environment to open and retain windows of advantage.

Research in this Project supports key Army needs and leverages/complements the technical research of several Program Elements (PEs) and Projects to include PE 0602143A (Soldier Lethality Technology) / BB4 (Dismounted Soldier Survivability Materials), Project AZ5 (Soldier Protection Technology - Vulnerability), Project AZ9 (Soldier Protection Advanced Tech - Detectability); PE 0601102A (Defense Research Sciences; and PE 0602145A (Next Generation Combat Vehicle Technology) / Project BI2 (Sensor Protection Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Soldier Camouflage, Concealment and Decoys Demonstration	2.861	3.005	3.130
Description: This effort demonstrates innovative camouflage, concealment, and deception technologies for the dismounted Soldier to defeat advanced current and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats and to reduce the probability of detection and identification across the electromagnetic spectrum. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment, assisting to close the capability gap between current camouflage, concealment, and deception technologies and defeating enemy sensorial capabilities in future operating environments. *FY 2023 Plans:*			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Mature materials specifically designed to reduce the radar cross section of individual Soldiers and their equipment from detection by ground surveillance radar threats; integrate and demonstrate passive ground surveillance radar threat detection capability into the Soldier's equipment to provide early threat detection and warning; attain and collect imagery data of Soldiers and squad formations against ground and aerial sensor threats to validate ground-force vulnerabilities in multiple bands of the electromagnetic spectrum against sensor threats to assess high impact camouflage and concealment opportunities; exploit and demonstrate aided target detection algorithms and provide vulnerability analysis of Soldier camouflage and concealment capabilities to support continued assessment of Soldier signature capability gaps. *FY 2024 Plans:* Will demonstrate overgarments specifically designed to camouflage a Soldier's signature from battlefield sensors operating in the infrared (thermal) wavelengths in multiple environments to enable Soldiers with greater freedom of movement in close combat; demonstrate optimized topical spray paints for Soldier clothing and individual equipment for improved concealment against SWIR sensor threats; optimize and perform Soldier user assessments of passive ground surveillance radar threat detection devices to provide advanced notice of threat for greater situational awareness and tactical advantage; collect imagery data of Soldiers and squad formations against ground and aerial sensor threats in jungle environments to validate ground-force vulnerabilities in multiple bands of the electromagnetic spectrum against sensor threats to assess high impact camouflage and concealment opportunities; baseline Soldier signature across the threat spectrum obtained in arctic, urban and jungle environments to define Soldier signature capability gaps against ground and air sensor threats. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.079	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	2.861	3.084	3.130

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** AZ6 *I Soldier Signature Management Advanced Technology*

D. Acquisition Strategy
  N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army									**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*				**Project (Number/Name)** BB3 *I Dismounted Soldier Survivability Equip/Tech Integ*		

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BB3: *Dismounted Soldier Survivability Equip/Tech Integ*	-	2.915	3.458	3.538	-	3.538	3.538	3.542	3.544	3.583	0.000	24.118
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates the integration of Soldier survivability materials and technologies to increase the speed and efficiency of dismounted Soldier movement and maneuver. This Project focuses on reducing Soldier-worn equipment weight, improving Soldier and system integration and reducing the dismounted Soldier's detectability, susceptibility, and vulnerability to operational threats. Operational threats are characterized as combat threats (e.g., flame and thermal, blast and ballistic, multispectral sensors, and laser threats), environmental threats (e.g., cold, heat, wet, vector, water contamination, concealment, etc.), and Soldier system components and system limitations (e.g., size, weight, and bulk). This Project includes the demonstration and validation of integrated technologies, novel subsystems/ systems, and test methods.

This Project complements work done in Program Element (PE) 0602143A (Soldier Lethality Technology) / Project BB4 (Dismounted Soldier Survivability Materials).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Dismounted Soldier Survivability Equipment and Technology Integration ***Description:*** This effort matures and integrates multifunctional protective materials, sub-components, and systems for field demonstrations to significantly increase the survivability of Soldiers through their multi-functional clothing and individual protective equipment. This effort also demonstrates and validates tradeoff analyses in sub-component and system-level designs of ballistic, blast, signature management and integrated protection clothing and equipment technologies. ***FY 2023 Plans:*** Demonstrate an improved load-management system that integrates body-worn individual equipment, power and data distribution network, hydration system, and torso protection to greatly improve Soldier lethality and maneuverability; mature enhancements in the combat ensemble that provide greater situational awareness of battlefield threats in (1) temperate to extreme cold environments and (2) temperate to extreme heat and high humidity environments to optimize Soldier readiness to shoot, move and communicate; perform Soldier user assessments of integration of matured camouflage and concealment materials from PE 0602143A (Soldier Lethality Technology) and modular ballistic and blast protection from PE 0602143A (Soldier Lethality	2.915	3.338	3.538

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BB3 *I Dismounted Soldier Survivability Equip/Tech Integ*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Technology) against anti-personnel munitions and small arms threats to evaluate compatibility with matured and optimized systems-engineering architecture for Soldier ensembles in support of the CAPE program. *FY 2024 Plans:* Will demonstrate optimized, well-integrated uniform and load management system enhancements that provide greater survivability against battlefield threats in (1) temperate to extreme cold environments and (2) temperate to extreme heat and high humidity environments; perform Soldier user assessments of optimized adjustable load frame to better accommodate the range of Soldier statures; mature and demonstrate Soldier and Squad level desalination devices that provide potable water from indigenous sources, improving maneuverability and reducing logistical burden; validate optimized camouflage and concealment materials from PE 0602143A (Soldier Lethality Technology) and modular ballistic and blast protection from PE 0602143A (Soldier Lethality Technology) against anti-personnel munitions and small arms threats for integration with uniform and load management system architectures matured under the Combat Protective Ensemble (CAPE) program. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding changes reflect planned life cycle of effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.120	-
Accomplishments/Planned Programs Subtotals	2.915	3.458	3.538

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks

D. Acquisition Strategy
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*					**Project (Number/Name)** BB8 *I Soldier Centric Advanced Technology*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BB8: *Soldier Centric Advanced Technology*	-	5.099	2.391	1.888	-	1.888	-	-	-	-	0.000	9.378
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates an optimized training systems to enable effective training and provide increased levels of Soldier proficiency and readiness. This Project matures and demonstrates Soldier centric technologies for the Soldier/Squad virtual environment to support the Army's Synthetic Training Environment (STE). The STE is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. The Soldier/Squad virtual environment combines and integrates several individual Soldier and Squad training capabilities, STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be conducted simultaneously or individually and enable physical movement/exertion related to the execution of Soldier/Marine individual and Squad collective training tasks. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy and supports the STE Cross Functional Team.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: STE Soldier/Squad Virtual Trainer *Description:* This effort matures and demonstrates a common battle drill squad-level mixed reality based system that allows for the rapid conduct and repetition of squad-level training. The training system will make it possible to conduct diverse, repeatable and effective training without extensive training infrastructure. This effort matures and demonstrates novel and realistic training environments that provide increased levels of proficiency and readiness through immersive training scenarios conducted at the point of need. *FY 2023 Plans:* Demonstrate the performance of agnostic camera and tracking technologies required for dynamic occlusion to perform in daylight training environments successfully; improve individual Soldier position- and orientation-tracking; demonstrate multi-modal, Soldier interfaces (e.g., haptic suits, 3D sound, acoustics, etc.) for individual Soldiers in live training environments. *FY 2024 Plans:*	5.099	2.317	1.888

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BB8 I *Soldier Centric Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will complete maturation of agnostic camera and tracking technologies required for dynamic occlusion to perform in daylight training environments; and optimize individual Soldier position- and orientation-tracking technologies. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease supports shift to long-term objectives of merging live and synthetic training.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.074	-
Accomplishments/Planned Programs Subtotals	5.099	2.391	1.888

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*				**Project (Number/Name)** BC1 I *Human Performance AdvTech for Mobility & Lethality*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BC1: *Human Performance AdvTech for Mobility & Lethality*	-	13.433	9.415	7.017	-	7.017	7.415	17.346	24.359	26.062	0.000	105.047
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures technologies, methodologies, and human performance models to demonstrate increased mobility and lethality of the individual and small unit to achieve overmatch. It validates and integrates human performance assessment methods and algorithms into training/education, test and evaluation methodologies, and materiel solutions to compare performance impacts between different materiel and non-materiel solutions to maximize the individual Warfighter and small unit. These methods and algorithms have potential to enable the development of aspects of doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) improvements and efficiencies. This Project also uses Soldier assessments to iteratively improve the performance of, optimize, and integrate technologies to augment Soldier function (e.g. shoot, move, perceive, decide, and communicate) during missions for maximizing performance. This Project supports the Measuring and Advancing Soldier Tactical Readiness and Effectiveness (MASTR-E) Science and Technology program supported by the Office of the Secretary of Defense Close Combat Lethality Task Force.

This Project supports key Army needs and complements the technical research of Program Element (PE) 0602143A (Soldier Lethality Technology) / Project BC6 (Human Perf-Tech for Warfighter Enhancement) and project BC2 (Next Gen Mobility & Lethality Tech for Warfighters). This research is also supported by and fully coordinated with efforts conducted by Medical Research & Development Command (MRDC), Army Research Institute (ARI), U.S. Military Academy (USMA), and other academic and industry partners. This research is in partnership with Forces Command (FORSCOM) operational units and the appropriate Training and Doctrine Command (TRADOC) organizations as well as established transition partners, including Program Executive Office-Soldier (PEO-S). This Project also complements and is fully coordinated with work performed across Army, Navy, and Air Force under the Reliance 21 Human Systems Community of Interest: Systems Interfaces & Cognitive Processes and Protection, Sustainment, and Warfighter Performance.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Close Combat Lethality Task Force, the Army Modernization Strategy and supports the Soldier Lethality Cross Function Team (CFT) efforts.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Soldier/Squad Performance Metrics for Lethality	4.468	-	-
Description: This effort validates and matures technologies, methodologies, and human performance models to demonstrate increased Soldier and Small Unit mobility & lethality to achieve overmatch. The effort validates and integrates human performance sensors, models, and design guidance into training/education, test and evaluation, and materiel. The results of this work will allow			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*		**Project (Number/Name)** BC1 *I Human Performance AdvTech for Mobility & Lethality*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
the Army to develop equipment, systems and training devices that maximize the close combat Soldier and small unit performance in multi-domain operations.			
Title: Operational Unit Partnership and Soldier Touch Point **Description:** This effort optimizes innovation through Science and Technology touch points with the Operational force, resulting in rapid iteration, concept maturation, integration, validation of laboratory findings, and transition of technologies and methodologies in response to operational unit demand signal. This effort streamlines demonstration, data collection, and technology maturation for near term DOTMLPF solutions, enabling faster delivery of materiel and non-materiel products/knowledge refined with direct Soldier input. This body of work allows validated, empirical, assessment of any equipment capability or training intervention as part of the Soldier architecture to inform future acquisition investments, training, and operational trade space decisions. **FY 2023 Plans:** Will conduct field and simulation studies to validate prediction models (previously trained with human performance data) in relevant environments/scenarios under realistic operational states (e.g., high stress, thermal load, dehydration, sleep restriction, etc.) in order to evaluate the correspondence between predictions and performance outcomes; conduct field studies testing the effectiveness of enhancement strategies on close combat performance outcomes and readiness. **FY 2024 Plans:** Will integrate field study data and algorithms into performance prediction models; conduct iterative Soldier Touch Points (STPs) demonstrations with FORSCOM partners to refine prediction models (e.g., prediction outcomes and information portrayal); demonstrate the capabilities and outputs from the Measuring and Advancing Soldier Tactical Readiness and Effectiveness MASTR-E) Program in a culminating event. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding decrease reflects the ramping down of the MASTR-E program	8.965	9.171	7.017
Title: SBIR/STTR Transfer **Description:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 Plans:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding transferred in accordance with Title 15 USC §638	-	0.244	-
Accomplishments/Planned Programs Subtotals	13.433	9.415	7.017

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC1 *I Human Performance AdvTech for Mobility & Lethality*

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*					**Project (Number/Name)** BC8 / *Training Advanced Technology (Other than STE)*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BC8: *Training Advanced Technology (Other than STE)*	-	2.884	7.078	7.684	-	7.684	10.347	24.401	32.458	32.802	0.000	117.654
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced training technologies in support of the Army's need for simulations that accurately replicate and realistically represent the effects of current and future weapons systems during live and synthetic training. Integration of the live and synthetic environments into a single synthetic training environment will modernize the current Live Training Environment and allow fair fight engagements across all training environments and training devices.

This Project complements work done in Program Element (PE)0602143A (Soldier Lethality Technology) / Project BC7 (Training Technology (Other than STE).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: STE: Live Training Applications	2.884	-	-
Description: This effort exploits technology to demonstrate enhanced fidelity of live training systems and develops future live training capabilities for conducting force-on-force, combined arms exercises to enhance readiness at Army home stations and Combat Training Centers.			
Title: Advanced Processing Technologies for Live Training	-	3.828	4.449
Description: This effort will improve technologies that reduce the computational burden, latency, and power consumption (battery weight) associated with training dismounted Soldiers in live training environments that leverage simulated tactical engagements. Such live training use-cases require virtual ballistic flyout calculations, casualty assessment, and visualization of terminal effects (e.g., munition impacts). *FY 2023 Plans:* Will demonstrate methods to couple lethality, vulnerability, and terrain models with real-world sensors to generate realistic virtual ballistic flyout and casualty assessment models that reduce weight and functional impacts to the Soldier; validate architectures to			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
account for truncated calculation space, data compression, parallelization, 3D terrain tiling, high-speed commercial hardware, and smart RF network packet routing. *FY 2024 Plans:* Will mature and demonstrate hardware and algorithm benchmarks to validate ballistic flyout calculations and casualty assessments; demonstrate sensor fusion techniques to improve overall computational performance for ballistic flyout and casualty assessment in a distributed environment. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase covers the initial benchmarking activities to support the future optimization and validation of sensor fusion techniques.			
Title: Synthetic Cyberspace Effects for Training *Description:* This effort matures, demonstrates, and validates a data exchange model for cyberspace effects and a brokering architecture to propagate those cyberspace effects across Live, Virtual and Constructive models and simulations within distributed training environments for collective training. *FY 2023 Plans:* Will mature cyberspace data model and effects brokering architecture to incorporate cyber, electronic warfare, and Global Positioning System (GPS) effects for Brigade-level collective training; validate multi-domain use-cases and identify large-scale exercises to leverage for data collection and demonstration. *FY 2024 Plans:* Will continue to mature cyberspace data model and effects brokering architecture to incorporate cyber, electronic warfare, and Global Positioning System (GPS) effects for Brigade-level collective training; validate multi-domain use-cases and identify large-scale exercises to leverage for data collection and demonstration. Begin integration of external models to validate overall architecture decisions. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort	-	2.998	3.235
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:*	-	0.252	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC8 *I Training Advanced Technology (Other than STE)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement:			
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	2.884	7.078	7.684

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*				**Project (Number/Name)** BC9 I *Adv Soldier Sensors/Displays AdvTech for Dismounts*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BC9: *Adv Soldier Sensors/ Displays AdvTech for Dismounts*	-	12.671	25.963	27.160	-	27.160	26.756	28.610	29.152	29.470	0.000	179.782
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, optimizes, and demonstrates fully digital sensor systems, architectures, and interfacing capabilities to fuse sensors, and network situational understanding information and targeting capabilities to enable maintained mounted and dismounted visual advantage, increased situational awareness, decreased fratricide, and decreased response times to all threats in all environments.

Research in this Project supports the Army Science and Technology Soldier Lethality, Next Generation Combat Vehicle, and Future Vertical Lift Army Modernization priorities.

This Project complements work done in Program Element (PE) 0602143A (Soldier Lethality Technology) / BD1 (Advanced Soldier Sensors/Displays Tech for Dismounts).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and supports the Soldier Lethality Cross Functional Team (CFT).

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Advanced Soldier Sensors/Displays Advanced Technology for Dismounts	12.671	25.302	27.160
Description: This effort will mature and demonstrate low cost Soldier-borne situational understanding systems with greater fidelity for improved maneuver and lethality, as well as integrates automated target cueing to increase probability of recognition/ identification and tracking of threats in all environments. *FY 2023 Plans:* Mature advanced infrared sensors leveraging emerging multiple sensor modalities for incorporation into various soldier borne sensor systems; mature covert eye tracking, parallax correction and multi-plane display technologies to enable the next generation of digital sensor and head mounted display capabilities for dismounted Soldier situational awareness and mobility; improve performance of optics detection capability against concealed infrared threats while reducing size and weight for small platform use; optimize sensor approaches enabling low false alarms, stand-off range, signature reduction, and threat location			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC9 *I Adv Soldier Sensors/Displays AdvTech for Dismounts*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
accuracy; demonstrate AR systems for mounted infantry interactions with heading corrections and self-location capabilities within a combat vehicle while on the move; optimize sensor systems integrated with command and control systems for information sharing capabilities between dismounted and mounted Soldiers on a tactical vehicle platform for soldier touchpoint assessment on representative platforms; optimize sensor payloads and processing approaches for enhanced autonomy to enable target localization and notification capabilities on smaller aerial platforms enabling improved situational awareness against all threats; optimize performance of image processing techniques to improve threat detection at longer ranges, and frame rates required for dismounted hostile fire detection; validate optical and acoustic techniques to enable dismounted multi-modal hostile fire detection. *FY 2024 Plans:* Will optimize improved multi-plane display technologies and demonstrate parallax correction to expand use-cases while minimizing Size, Weight, and Power (SWaP); mature advanced covert depth sensing technologies to enable the next generation of digital sensor and head mounted display capabilities for dismounted Soldier situational awareness and mobility; integrate improved optics detection performance onto reduced pathfinder hardware with reduced SWaP and demonstrate in a field-relevant environment; mature sensor payload processing approaches to enable real-time course of action suggestion and automated cueing capabilities while on smaller aerial platforms for improved situational awareness and targeting against all threats; optimize sensor configurations on host platform and validate performance of image processing techniques for improved dismounted hostile fire detection; demonstrate trajectory visualization in a representative virtual environment to quantify improvement of target engagement timelines while validating required improved orientation sensing accuracy. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase represents funding for technology maturation needed to leverage breakthroughs in sensors and sensor fusion and inject them into critical dismounted Soldier systems to enable decision dominance and improved lethality at all echelons.			
Title: SBIR/STTR Transfer	-	0.661	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	12.671	25.963	27.160

C. Other Program Funding Summary ($ in Millions)

 N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC9 *I Adv Soldier Sensors/Displays AdvTech for Dismounts*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*					**Project (Number/Name)** BD7 I *Soldier Sys Interfaces/Integration-Sensor AdvTech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BD7: *Soldier Sys Interfaces/ Integration-Sensor AdvTech*	-	8.068	8.504	7.931	-	7.931	8.638	9.372	9.378	9.480	0.000	61.371
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will integrate and mature technologies for sensing, processing, displaying information, interfacing with users, and cognitive improvement to enhance Soldier & Small Unit situational awareness & understanding. This Project will integrate and demonstrate battlefield, body-worn sensors, and data fusion algorithms to provide the dismounted Small Unit leader with clear, actionable information for making well informed, rapid, tactical decisions. This Project will also mature and integrate advanced dismounted Soldier robotic and autonomous systems technologies to demonstrate autonomous navigation, manned-unmanned teaming, and networked reconnaissance to improve Soldier lethality, situational awareness, and survivability during tactical operations.

Research in this Project complements several Program Elements (PEs) and Projects to include PE 0602143A (Soldier Lethality Technology) / BD6 (Soldier Sys Interfaces/Integration - Sensor Tech), Project BB9 (Human Performance Tech for Mobility & Lethality), and PE 0603118A (Soldier Lethality Advanced Technology) / Project BC9 (Adv Soldier Sensors/Displays AdvTech for Dismounts).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and the Soldier Lethality Cross Functional Team (CFT).

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Soldier System Interfaces & Integration (Sensor Advanced Technology)	8.068	8.254	7.931
Description: This effort will integrate battlefield and body-worn sensors and mature data-fusion algorithms to provide the dismounted Small Unit leader with clear, actionable information to make well informed, rapid, tactical decisions. This effort will mature and integrate advanced dismounted Soldier robotic and autonomous systems technologies to demonstrate autonomous navigation, manned-unmanned teaming, and networked reconnaissance to improve Soldier lethality, situational awareness, and survivability during tactical operations. *FY 2023 Plans:* Will mature and demonstrate Small Unit leader planning tools with the IVAS to enhance tactical decision making; mature and integrate human performance, Soldier equipment, and remote sensing capabilities with IVAS to enhance Soldier situational awareness & understanding during distributed operations; conduct field demonstrations of Sensored Soldier technologies with			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BD7 / *Soldier Sys Interfaces/Integration-Sensor AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
IVAS, Soldier Lethality, and other Army systems in relevant operational environments to validate performance and functionality; mature autonomous tactical algorithms for Army SUAS (e.g., nighttime navigation, perch and stare, landing site selection) and integrate them on military relevant platforms; demonstrate SUAS autonomy capabilities in relevant field environments to validate the performance and operation of the technologies; integrate and demonstrate small unit logistical planning tools that support data driven decisions for emergency and routine resupply at the tactical edge while conducting cross domain maneuver. *FY 2024 Plans:* Will optimize and mature actionable decision tools for the Integrated Visual Augmentation System (IVAS) to enhance remote sensing, equipment sensing, and human performance sensing capabilities for the Small Unit leader; conduct field demonstrations of integrated Soldier situational awareness technologies, sensors, and unmanned systems with IVAS and other networked Army platforms to improve tactical decision making and enhance Soldier Lethality for cross-domain maneuver; mature, integrate and demonstrate advanced autonomous tactical capabilities for Army SUAS (Soldier Borne Sensor (SBS) and Short Range Reconnaissance (SRR)) during Soldier field events to enhance the Squad and Platoons targeting and situational awareness; integrate and validate additional logistical delivery platforms with the small unit resupply consumption and delivery mission planning tool, for both routine and emergency logistical resupply situations and in support of contested logistics. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects realignment of $300K to PE 0602143A (Soldier Lethality Technology) / BD6 (Soldier Sys Interfaces/ Integration - Sensor Tech).			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.250	-
Accomplishments/Planned Programs Subtotals	8.068	8.504	7.931

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BD7 *I Soldier Sys Interfaces/Integration-Sensor AdvTech*

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*					Project (Number/Name) BD9 / *Soldier & Sm Unit Tactical Energy AdvTech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BD9: *Soldier & Sm Unit Tactical Energy AdvTech*	-	3.055	4.189	9.310	-	9.310	7.562	6.560	5.054	5.104	0.000	40.834
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will demonstrate advanced Power and Energy (P&E) technologies for the dismounted Soldier to lighten equipment load, reduce resupply need, and enhance mobility. This Project will conduct Soldier and Small Unit power and energy technology maturation, integration with clothing and individual equipment, technical analysis, and operational assessment.

Work in this Project complements several Program Elements (PEs) to include PE 0603118A (Soldier Lethality Advanced Technology) / project BD7 (Soldier Sys Interfaces/ Integration AdvTech), Project BD8 (Soldier & Sm Unit Tactical Energy Tech), and PE 0603118A (Soldier Lethality Advanced Technology) / Project BC9 (Adv Soldier Sensors/Displays AdvTech for Dismounts).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and the Soldier Lethality Cross Functional Team (CFT).

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Dismounted Soldier Power and Energy *Description:* This effort matures, integrates, and demonstrates advanced Soldier P&E technologies that are used to power the dismounted Soldier and small unit's command and control, communications, computers, and sensor devices during tactical operations. This work will result in the Army being able to provide the power and energy the future Soldier requires to operate effectively, while doing so at a reduced physical burden. *FY 2023 Plans:* Will optimize technologies to efficiently transfer power between the conformal wearable battery and the Soldier's weapon to recharge the weapon battery during dismounted operations; mature technologies to improve the safety and increase the energy density of Soldier carried rechargeable batteries; mature Soldier carried power generators to increase efficiency, reduce weight, and improve compatibility with Soldier equipment; conduct field demonstrations to validate the performance and operation of	3.055	4.143	4.269

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BD9 I *Soldier & Sm Unit Tactical Energy AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Soldier and Squad power technologies; mature and validate a Soldier worn, portable data-acquisition system to accurately measure power and energy metrics during Soldier field evaluations. ***FY 2024 Plans:*** Will demonstrate high energy density Soldier batteries, such as Small Tactical Universal Battery (STUB) and the Conformal Wearable Battery (CWB), powering the Soldier's electronic equipment during Soldier field events; demonstrate advanced Soldier-carried power generators recharging batteries during Soldier field events; demonstrate efficient Soldier- worn power- transfer and management technologies for recharging the Soldier's batteries during Soldier field events. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.046	-
Title: Supply Resiliency for Soldier Power ***Description:*** This effort addresses battery supply chain security issues by specifically addressing small battery standardization maturity for DoD applications to be more lethal in dismounted operations. ***FY 2024 Plans:*** Will improve and demonstrate affordable small, standardized batteries, such as Small Tactical Universal Battery (STUB), Conformal Wearable Battery (CWB) and BB-2590 that are domestically sourced, to optimize operational runtime and reduce the weight and Soldier burden; optimize system adaptors for use with small, standardized batteries operating within Soldier tactical portable devices, such as Next Generation Squad Weapon (NGSW) and Enhanced Night Vision Goggle-Binocular (ENVG-B); mature Operational Single Cell for Accessory Readiness (OCSAR) to enable safe, single cell operation in enabler devices; characterize and validate operational capabilities at field demonstrations and finalize military standards (MIL-PRF-32383) so these standardized batteries can be readily adopted. ***FY 2023 to FY 2024 Increase/Decrease Statement:***	-	-	5.041

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BD9 / *Soldier & Sm Unit Tactical Energy AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
This increase addresses defense-wide critical battery supply chain security issues that would prevent the Army from fielding modernized capabilities on the Soldier platform using common standardized batteries such as sights, goggles, weapons, radios, GPS, etc. FY23 work in this task is linked to PE 0603462/BH6.			
Accomplishments/Planned Programs Subtotals	3.055	4.189	9.310

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603118A I *Soldier Lethality Advanced Technology*					**Project (Number/Name)** BE2 I *Joint Service Combat Feeding Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BE2: *Joint Service Combat Feeding Advanced Technology*	-	2.335	1.988	2.673	-	2.673	2.673	2.781	2.136	2.159	0.000	16.745
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates combat ration and field feeding technologies to optimize Warfighter performance, decrease the risk of exposure to chemical and biological contaminants in foods, and reduce the logistics burden to enable semi-independent operations. The Army serves as the Executive Agent for this Department of Defense (DoD) program, with oversight and coordination provided by the DoD Combat Feeding Research and Engineering Board.

This Project matures and demonstrates research done in Program Element (PE) 0602143A (Soldier Lethality Technology) / Project BE3 (Joint Service Combat Feeding Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Joint Service Combat Feeding Advanced Technology Demonstration	2.335	1.969	2.673
Description: This effort matures and demonstrates combat ration and field feeding technologies to optimize Warfighter performance, decrease risk of exposure to chemical and biological contaminants in foods, and reduce the logistics burden to enable semi-independent operations.			
FY 2023 Plans: Will demonstrate field-deployable biosensor detection platforms for multiple pathogens in food matrices to reduce risk of food-borne illness on the battlefield; validate effect of Close Combat Assault Ration on Warfighter physical performance to enable semi-independent operations; optimize commercially available surface treatment chemicals for mobile field feeding kitchen surfaces to improve force health protection; demonstrate stability and safety of membrane concentrate technology to reduce combat load; continue optimization of small scale atmospheric water harvester performance using an environmental chamber technique to decrease logistical burdens in multi-domain operations; and mature and demonstrate additive manufacturing technology to provide targeted nutrition-on-demand for optimal physical performance. *FY 2024 Plans:*			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE2 *I Joint Service Combat Feeding Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will validate manufacturability of developed phenolic containing products; optimize shelf stable Amino Acid/Protein ration components by completing storage studies and sensory analysis and acceptability; food matrices in support of alternative protein ration components will be down-selected for storage studies and evaluated for food safety, acceptability, and compound stability; mature, develop, assess, and demonstrate Food Additive Manufacturing (FAM) solutions; assess industry readiness for FAM to print nutrient tailored foods; validate the effectiveness of a non-thermal concentration technology to produce a microbiologically safe juice concentrate and subsequent ration components, and conduct a limited technology demonstration to assess user acceptance; demonstrate military packaging reductions technologies and validate results to determine if they meet these critical requirements: integrity, barrier performance, durability, and sensory analysis.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding in the amount of $642K realigned from PE 0602143A (Soldier Lethality Technology) / Project BE3 (Joint Service Combat Feeding Technology). Funding increase will enable future maturation and demonstration of combat ration and field feeding technologies.			
Title: SBIR/STTR Transfer	-	0.019	-
Description: Funding transferred in accordance with Title 15 USC §638 **FY 2023 Plans:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	2.335	1.988	2.673

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*				**Project (Number/Name)** BE5 *I Personnel & Airdrop Safety Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BE5: *Personnel & Airdrop Safety Advanced Technology*	-	6.628	6.484	6.632	-	6.632	6.705	7.354	7.358	7.439	0.000	48.600
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates equipment and innovative techniques for precision aerial delivery of cargo and personnel. Technologies support Army Modernization Priority, Soldier Lethality. Aerial delivery is a key capability for rapid force projection and global precision delivery to support the mission readiness profile for Global Response Force (GRF). These efforts are designed to advance state of the art precision delivery technologies such as parachutes; guidance, navigation, and control (GNC) components and subsystems; tracking sensors; software algorithms; and safety rigging that integrates with currently equipped aircraft, unmanned aerial systems (UAS), and advanced rotary wing aircraft. These efforts provide the Warfighter with highly accurate, timely cargo/payload delivery and resupply in all terrain and weather conditions. Precision delivery/resupply reduces vulnerability of ground Soldiers, aircraft, and aircrew. Precision aerial delivery supports remote warfare with activities such as placement of battlefield sensors and reduction of Soldier load.

Research in this Project supports key Army needs and complements the technical research in Program Element (PE) 0602143A (Soldier Lethality Technology) / Project BR9 (Personnel & Airdrop Safety Technology). This Project also complements research done in the Science & Technology Precision, Navigation and Timing Modernization priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Personnel & Airdrop Safety Advanced Technology	6.628	6.308	6.632
Description: This effort matures and demonstrates parachute materials and designs, precision guidance, navigation software and hardware, tracking sensors, and safety devices to increase the accuracy of delivering cargo to remote locations and/or complex terrains in global positioning system (GPS) denied environments. This effort also provides technologies that increase safety during personnel insertions into theaters of operation. This effort supports capability demonstrations for mitigating the Army' s challenge of overburdened Soldiers through the use of tactical aerial resupply technologies, as well as supporting Anti-Access/Area Denial (A2/ AD) and manned-unmanned teaming (MUM-T) operational concepts by demonstrating airdrop from non-traditional platforms. *FY 2023 Plans:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE5 *I Personnel & Airdrop Safety Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Optimize and demonstrate integration of low-cost suite of guidance, navigation, and control sensors, to enable robust positioning estimates in GPS denied conditions; demonstrate and validate sensor integration on an autonomously guided aerial resupply system, in operationally relevant environment; incrementally mature and demonstrate autonomous technologies on personnel infiltration/exfiltration systems (PIES) in live environment, with both dependent and autonomous controls; demonstrate Next Generation Static Line (NGSL) advancements in control authority in a live environment that reflects IRF challenges. *FY 2024 Plans:* Will Integrate personnel infiltration system subcomponents and demonstrate full mission profile in live environment; Integrate and demonstrate preflight mission planning subcomponents into resupply vehicle's mission execution hardware; Validate and mature design of resupply vehicles that enhance autonomy, increase offset distances, and increase cargo weight; Demonstrate next generation static line (NGSL) performance and safety technologies, addressing increased weight capacity and improved weight distribution on the soldier. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.176	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	6.628	6.484	6.632

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*					**Project (Number/Name)** BE9 / *STE Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BE9: *STE Advanced Technology*	-	12.942	10.656	8.342	-	8.342	7.495	-	-	-	0.000	39.435
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies supporting the Army's Synthetic Training Environment (STE). The STE is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi- Domain Operations. STE Information Systems (STE-IS) delivers the Common Synthetic Environment consisting of Global Terrain/One World Terrain (OWT), Training Simulation Software (TSS), and Training Management Tools (TMT). The STE will be available where training occurs (home station, combat training centers, armories, institutions, shipboard, deployed) and will include Air and Ground Reconfigurable Virtual Collective Trainers (RVCTs), a Soldier/Squad Virtual Training (S/SVT), and a live training capability. The STE will be cloud-enabled, compatible with the Army Enterprise Network, and service-based through the Common Operating Environment, including Live and Constructive. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle.

This Project complements research done in Program Element (PE) 0602143A (Soldier Lethality Technology) / Project BE8 (Synthetic Training Environment (STE) Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and supports the STE Cross Functional Team efforts.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: STE Training Management Tool	3.187	2.814	1.705
Description: This effort matures and demonstrates STE-relevant tools and technologies that automatically adapt training to the learner's skill level, conduct intelligent after action reviews, automate team training assessments, and enable the visualization of and interaction with a Mixed Reality Common Operating Picture of the battlespace. *FY 2023 Plans:* Demonstrate the integration of automated performance measures from both live and simulated small-unit training events in a team-competency tracking architecture that uses Department of Defense standards; optimize models and algorithms to measure squad-level competencies for integration into the STE; exploit human-performance data and demonstrate dashboards that visualizes competency acquisition over time and across multiple training interactions; mature and demonstrate the integration			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE9 / *STE Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
between competency tracking architecture and visualization tools for small-unit after-action review and for Multi-Domain Operations mission planning and mission command at higher echelons. *FY 2024 Plans:* Will validate the integration of automated performance measures from both live and simulated small-unit training events in a team-competency tracking architecture; mature models and algorithms to measure squad-level competencies for integration into the STE; mature dashboards to visualize competency acquisition over time and across multiple training interactions; exploit competency tracking and visualization technologies for small-unit after-action review and for Multi-Domain Operations mission planning and mission command at higher echelons. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects a shift in research focus from the near-term development of the STE capabilities to longer term research supporting training of multi-domain operations on complex, data-intensive battlefields.			
Title: STE One World Terrain *Description:* This effort matures and demonstrates tools and methods that improve the speed, fidelity and delivery of synthetic terrain and environmental data needed to support mission rehearsal and training in a representation of the globe, fully accessible through the Army network and usable by all simulation trainers. This effort also matures and develops complex representations (including megacities and subterranean) of the operational environment and the Multi-Domain battlefield in synthetic training environments. *FY 2023 Plans:* Demonstrate processes, tools and software for surface indentation, classification and extraction for material and terrain artifacts supporting the ability to access, explore, modify, and retrieve 3-D content from the OWT 3-D Foundational Data; establish processes and standards to balance the tradespace of enterprise (unconstrained) vs. point-of-need (constrained) terrain needs conforming to network design and constraint space such as how much content should be pre-loaded vs. on-demand; demonstrate automation across the 3-D terrain generation pipeline to accelerate ground-truth 3-D content delivery. *FY 2024 Plans:* Will demonstrate processes, tools and software to deliver 3D synthetic content in constrained and unconstrained environments; continue to optimize 3D user interfaces for the identification, classification, and extraction of material and terrain artifacts for usage in collective training. *FY 2023 to FY 2024 Increase/Decrease Statement:*	2.805	4.171	6.637

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE9 *I STE Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase to provide and demonstrate processes and tools that could enable OWT content and application usage in constrained environments.			
Title: STE Training Simulation Software	6.950	3.367	-
Description: This effort matures and demonstrates technologies that support Multi-Domain Operations modeling and simulation configuration and scalability technologies for collective training. In addition, matures and demonstrates technologies that allow the synthesis of robust military behaviors that enable the scaling of STE collective training configurations and delivery to the Point of Need through the exploitation of emerging computing and networking technologies that optimize computing architectures for integrating components (models, behaviors, data, etc.) of the Training Simulation Software (TSS). *FY 2023 Plans:* Demonstrate dynamic integration of STE-simulation components (models, behaviors, data, etc.) in a point-of-need collective-training use case featuring local and distributed simulation; mature and demonstrate Operational Environment models (e.g., Areas, Structures, Capabilities, Organizations, People, Events [ASCOPE]/Political, Military, Economic, Social, Information, Infrastructure- Physical environment and Time [PMESII-PT]) to enhance the representation of Multi-Domain Operations in Army simulations. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects a shift in research focus from the near-term development of the STE capabilities to longer-term research supporting training of multi-domain operations on complex, data-intensive battlefields.			
Title: SBIR/STTR Transfer	-	0.304	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	12.942	10.656	8.342

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE9 / *STE Advanced Technology*
D. Acquisition Strategy N/A		

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced* *Technology*					**Project (Number/Name)** BS8 / *Soldier Lethality Advanced* *Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BS8: *Soldier Lethality Advanced Technology*	-	44.500	53.750	-	-	-	-	-	-	-	0.000	98.250
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Congressional Interest Item funding provided for Soldier Lethality Advanced Technology.

A. Mission Description and Budget Item Justification
 Congressional Interest Item funding provided for Soldier Lethality Advanced Technology.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Program Increase - Advanced AI/AA Analytics for Modernization and Readiness	10.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Advanced AI/AA Analytics for Modernization and Readiness		
Congressional Add: Program Increase - Small Arms Fire Control Advanced Technology	8.000	4.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Small Arms Fire Control Advanced Technology		
FY 2023 Plans: Congressional Interest Item funding provided for Small Arms Fire Control Advanced Technology		
Congressional Add: Ferrium Steel for Improved Personal Protective Equipment	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Ferrium Steel for Improved Personal Protective Equipment		
Congressional Add: Human Machine Teaming	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Human Machine Teaming		
Congressional Add: Impact Attenuation Materials for Limb Protection	1.500	-

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Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BS8 / *Soldier Lethality Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Impact Attenuation Materials for Limb Protection		
Congressional Add: Soldier Situational Awareness	8.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Soldier Situational Awareness		
Congressional Add: Squad Operations Advanced Resupply	8.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Squad Operations Advanced Resupply		
Congressional Add: Program Increase - ADVANCED TECHNOLOGY DEVELOPMENT FOR MDO TO SUPPORT SOLDIER LETHALITY	-	15.000
FY 2023 Plans: Congressional Interest Item funding provided for ADVANCED TECHNOLOGY DEVELOPMENT FOR MDO TO SUPPORT SOLDIER LETHALITY		
Congressional Add: Program Increase - HMD RISK REDUCTION FOR IVAS FUTURES	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for HMD RISK REDUCTION FOR IVAS FUTURES		
Congressional Add: Program Increase - HYPER ENABLED SOLDIER LETHALITY	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for HYPER ENABLED SOLDIER LETHALITY		
Congressional Add: Program Increase - HYPERSONIC WEAPON DEVELOPMENT SOFTWARE	-	2.000
FY 2023 Plans: Congressional Interest Item funding provided for HYPERSONIC WEAPON DEVELOPMENT SOFTWARE		
Congressional Add: Program Increase - SHOCK ATTENUATION AND BLUNT FORCE TRAUMA IMPROVEMENTS IN HEADBORNE	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for SHOCK ATTENUATION AND BLUNT FORCE TRAUMA IMPROVEMENTS IN HEADBORNE		
Congressional Add: Program Increase - SPECTROSCOPY DEVICES FOR CHEM BIO DETECTION AND DEACTIVATION WITH UV-C	-	11.250

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*	**Project (Number/Name)** BS8 *I Soldier Lethality Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for SPECTROSCOPY DEVICES FOR CHEM BIO DETECTION AND DEACTIVATION WITH UV-C		
Congressional Add: Program Increase - Improvements to Arctic Heaters for Tents and Shelters	-	1.000
FY 2023 Plans: Congressional Interest Item funding provided for Improvements to Arctic Heaters for Tents and Shelters		
Congressional Adds Subtotals	44.500	53.750

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	281.637	415.846	40.597	-	40.597	42.661	44.700	52.667	50.502	0.000	928.610
BK8: *Robotics for Engineer Operations Adv Tech*	-	5.994	6.314	3.801	-	3.801	4.548	6.542	8.240	3.232	0.000	38.671
BK9: *Ground System Fluids and Fuels Adv Tech*	-	1.668	2.301	6.983	-	6.983	5.594	5.083	5.036	5.072	0.000	31.737
BL3: *Explosives Forensics Advanced Technology*	-	2.020	2.214	2.256	-	2.256	2.280	2.282	2.284	2.309	0.000	15.645
BL6: *Expedient Passive Protection Advanced Technology*	-	0.476	3.613	6.025	-	6.025	5.854	4.181	4.809	5.609	0.000	30.567
BL8: *Power Projection in A2AD Environments Adv Tech*	-	2.862	4.948	3.317	-	3.317	4.124	2.677	3.727	4.413	0.000	26.068
BM1: *Protection from Advanced Weapon Effects Adv Tech*	-	5.654	4.856	4.937	-	4.937	5.132	5.336	5.531	3.972	0.000	35.418
BO3: *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*	-	259.100	383.300	-	-	-	-	-	-	-	0.000	642.400
CJ9: *Ground Enabling University Adv Development*	-	3.863	3.896	4.214	-	4.214	6.036	6.137	6.140	6.207	0.000	36.493
CV5: *Engineer Enablers Maneuver, LOG, & Sustainment Adv*	-	-	2.539	3.313	-	3.313	4.808	2.700	5.557	5.532	0.000	24.449
DA2: *SAFR Alternatives for Readiness Advanced Tech*	-	-	1.865	2.926	-	2.926	4.285	9.762	11.343	14.156	0.000	44.337
DG2: *Advanced Development of Obscurants*	-	-	-	2.825	-	2.825	-	-	-	-	0.000	2.825

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates ground movement and maneuver technologies that support and enable the Army's modernization priority for the Next Generation of Combat Vehicles. This PE also matures, integrates and demonstrates advanced technologies that are necessary and foundational for legacy and future ground platforms and ground maneuver. These technology areas include: robotic and autonomous Army Combat Engineer equipment, liquid logistics (i.e.,

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	

fuels, lubricants, and oils) and related monitoring and distribution, forensic analysis of explosives and other chemical materials, rapidly deployable passive protection technologies, entry and maneuver assessment technologies and structural hardening technologies to protect personnel and critical assets from advanced weapon effects.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas in support of the National Defense Strategy.

Research is performed by the United States (U.S.) Army Futures Command and the U.S. Army Engineer Research and Development Center.

Research in this PE complements PE 0602144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology), and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	280.490	32.546	33.403	-	33.403
Current President's Budget	281.637	415.846	40.597	-	40.597
Total Adjustments	1.147	383.300	7.194	-	7.194
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	383.300			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.147	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	7.194	-	7.194

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: BO3: *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*		
Congressional Add: *Electrical System Safety and Reliability*	5.000	-
Congressional Add: *Cold Regions Research*	2.000	-
Congressional Add: *High-Performance Concrete Technology*	6.000	-
Congressional Add: *Secure Management of Energy Generation and Storage*	5.000	5.000
Congressional Add: *Composite Flywheel Technology*	7.000	-
Congressional Add: *Materials and Manufacturing Technology for Cold Environments*	4.000	4.000
Congressional Add: *Program Increase - Rapid Entry and Sustainment for the Arctic*	8.000	10.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		**Date:** March 2023	
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<u>**Congressional Add Details ($ in Millions, and Includes General Reductions)**</u>		**FY 2022**	**FY 2023**
Congressional Add: *Program Increase - Water Quality and Resiliency*		5.000	7.000
Congressional Add: *Program Increase - Organic Light Emitting Diode*		5.000	-
Congressional Add: *Program Increase - Infrastructure Resilience and Flood Assessment*		3.500	-
Congressional Add: *Program Increase - Clean Modular Hydro Technology*		8.000	20.000
Congressional Add: *Program Increase - Accelerator Technology for Ground Maneuver*		5.000	4.000
Congressional Add: *Program increase - Autonomous Combat Engineering Solutions*		4.000	-
Congressional Add: *Program Increase - Coastal Terrain Hazard Research*		6.000	-
Congressional Add: *Program Increase - Impacts of Soil Structures on Hydrology*		5.000	6.000
Congressional Add: *Program Increase - Cross-Laminated Timber and Recycled Carbon Fiber Materials*		5.500	5.500
Congressional Add: *3D Printing of Concrete*		2.000	-
Congressional Add: *3D Printing of Infrastructure*		5.000	-
Congressional Add: *Additive Construction for Field Deployment*		4.000	-
Congressional Add: *Anticipating Threats to Natural Systems*		5.000	6.000
Congressional Add: *Army Visual and Tactical Arctic Reconnaissance*		2.000	4.000
Congressional Add: *Assessments and Monitoring Systems for Historic Structures*		5.000	-
Congressional Add: *Autonomous Construction and Manufacturing*		5.000	5.000
Congressional Add: *Biofuel*		6.000	-
Congressional Add: *Biomass Polymer Technology*		2.000	-
Congressional Add: *Cold Weather Energy Research*		5.000	-
Congressional Add: *Cold Weather Research*		3.000	4.000
Congressional Add: *Distributed Technologies for Steam Loop Replacements*		5.000	-
Congressional Add: *Electrochemical Conversion of Water Streams*		5.000	-
Congressional Add: *Entry Control Points at Installations*		5.000	-
Congressional Add: *Expeditionary Additive Construction*		15.000	15.000
Congressional Add: *Explosive Materials Detection*		3.000	-
Congressional Add: *Frost Heave Effects Monitoring*		4.500	6.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Graphene Applications for Military Engineering*	10.000	10.000
Congressional Add: *Hardened Facility Standards*	4.600	5.500
Congressional Add: *High Power Fast Charging for Electric Vehicle Fleets*	3.000	5.000
Congressional Add: *Infrastructure Smart Technology*	5.000	-
Congressional Add: *Low Carbon Hydrogen Technologies*	10.000	10.000
Congressional Add: *Microgrid Reliability and Resiliency*	10.000	6.500
Congressional Add: *Military Waste Stream Conversion*	5.000	5.000
Congressional Add: *Partnership and Technology Transfer*	4.000	-
Congressional Add: *Power Generation for Increased Facility Resilience Pilot*	10.000	10.000
Congressional Add: *Power Projection*	7.000	5.000
Congressional Add: *Sustainable Smart Utilities*	5.000	-
Congressional Add: *Water Resiliency and Self Sufficiency*	4.000	-
Congressional Add: *Water Reuse Consortium*	10.000	10.000
Congressional Add: *Watercraft Simulator*	4.000	-
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING AND 3D PRINTING FOR DEPLOYABLE SHELTERS*	-	6.000
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING FOR WEAPONS AND ARMAMENTS COMPONENTS*	-	10.000
Congressional Add: *Program Increase - ADVANCED MULTI-STACK OLED MICRODISPLAYS*	-	8.800
Congressional Add: *Bio-derived coatings for high-performance applications*	-	2.000
Congressional Add: *Expanding engineering with nature installation capacity*	-	5.000
Congressional Add: *Mass timber applications for military construction projects*	-	12.000
Congressional Add: *Novel materials for smart infrastructure systems*	-	6.000
Congressional Add: *Rapid infrastructure development and engineering*	-	5.000
Congressional Add: *Ultra-high strength steels for construction applications*	-	6.000
Congressional Add: *Always ready distributed energy*	-	10.000
Congressional Add: *Self contained power for towers and sensors*	-	10.000
Congressional Add: *Ruggedized deployable solar generators*	-	10.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		**Date:** March 2023
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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *PFAS destruction industrial SCWO technology*	-	12.000
Congressional Add: *Sorbent enhanced clean hydrogen demonstration*	-	15.000
Congressional Add: *3D Printing of infrastructure - enabling cold weather construction capabilities*	-	5.000
Congressional Add: *Advanced coating development for infrastructure*	-	3.000
Congressional Add: *Arctic terrain sensing with drone platforms*	-	10.000
Congressional Add: *Cobalt free batteries*	-	3.000
Congressional Add: *Competition planning and evaluation infrastructure*	-	8.000
Congressional Add: *Delivered fuel decarbonization and resiliency*	-	5.000
Congressional Add: *Engineering practices for ecosystem design solutions*	-	6.500
Congressional Add: *Innovative design and manufacturing of advanced composites/multi material protective systems*	-	10.000
Congressional Add: *Logistically secure energy resources for resilient installation and mobility infrastructure*	-	5.000
Congressional Add: *Military Operations in permafrost environment*	-	3.500
Congressional Add: *Military training grounds research to support force readiness*	-	7.000
Congressional Add: *Operational and cyber resilient power for critical infrastructure*	-	8.000
Congressional Add: *Rapid Track repair*	-	3.000
Congressional Add: *Solid State rechargeable lithium batteries*	-	5.000
Congressional Add: *Sustainable distributed electric vehicle charging station*	-	3.000
Congressional Add: *Technology pilot for reliability, resilience, and energy efficiency*	-	3.000
Congressional Add: *Wildfire engineering for sustainability and resiliency*	-	6.000
Congressional Add: *Zero emission concrete*	-	3.000
Congressional Add: *National Hydrography Dataset*	2.000	-
Congressional Add Subtotals for Project: BO3	259.100	383.300
Congressional Add Totals for all Projects	259.100	383.300

Change Summary Explanation

the increase is due a focus on conducting demonstration and testing of fluids for vehicle electrification and smart fuel meeting and a new start enabling effort on vulnerability from advanced obscurants

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army | **Date:** March 2023

Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603119A I *Ground Advanced Technology*	Project (Number/Name) BK8 I *Robotics for Engineer Operations Adv Tech*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BK8: *Robotics for Engineer Operations Adv Tech*	-	5.994	6.314	3.801	-	3.801	4.548	6.542	8.240	3.232	0.000	38.671
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates robotic engineer equipment capabilities that can remotely characterize the environment and operate in the battlespace for autonomous Combat Engineer actions. This Project provides technologies for Combat Engineer mission planning, creating or reducing barriers and obstacles, as well as maintaining, repairing, and constructing expedient infrastructure. These efforts will enhance Combat Engineer missions of mobility, counter mobility, and survivability through semi-autonomous or autonomous operations.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BK7 (Robotics for Engineer Operations Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Army Science and Technology Ground Portfolio.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Beyond-Visual-Line-of-Sight Tele-operated Engineer Operations Demonstration *Description:* This effort matures and demonstrates remote control and semi-autonomous behaviors on small scale construction equipment to provide information that scales to larger legacy equipment as well as assess the applicability of small scale equipment working in collaboration and coordination. *FY 2023 Plans:* Demonstrate operator assist capabilities for BVLOS execution of a Combat Engineer task. Validate capabilities for autonomous Engineer site characterization and BVLOS teleoperation of multiple pieces of heavy Engineer equipment in a Joint exercise supporting Multi-Domain Operations. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle conclusion of this effort completing in FY2023 with products transitioned to United States Army Facilities Components System. Resources are realigned to PE0602144A (Ground Technology) / Project BK7 (Robotics for Engineer Operations Technology) / task Semi-Autonomous Engineer Operations and PE 0603119	5.767	6.197	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BK8 *I Robotics for Engineer Operations Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
(Ground Advanced Technology) / Project BK8 / (Robotics for Engineer Operations Adv Tech) Task Semi-Autonomous Engr Ops Demonstration.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	0.227	0.117	-
Title: Semi-Autonomous Engr Ops Demonstration *Description:* This effort matures and demonstrates machine tool behaviors to perform semi-autonomous shaping of the terrain through physical interaction with the environment (push, pull, lift, and dig). The effort develops the necessary decision-making, data fusion, localization, and inter-platform communication to allow semi-autonomy on commercial off the shelf (COTS) equipment. *FY 2024 Plans:* Will implement, mature, and demonstrate the required sensor payload, onboard processing, and control algorithms on heavy Engineer equipment to enable semiautonomous operations within an area of interest; mature and demonstrate semi-autonomous execution of a simple Engineer task. *FY 2023 to FY 2024 Increase/Decrease Statement:* This is a new effort in FY24 to mature and demonstrate semi-autonomous terrain shaping using commercial off the shelf (COTS) equipment.	-	-	3.801
Accomplishments/Planned Programs Subtotals	5.994	6.314	3.801

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3					**R-1 Program Element (Number/Name)** PE 0603119A I *Ground Advanced Technology*				**Project (Number/Name)** BK9 I *Ground System Fluids and Fuels Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BK9: *Ground System Fluids and Fuels Adv Tech*	-	1.668	2.301	6.983	-	6.983	5.594	5.083	5.036	5.072	0.000	31.737
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates liquid logistics technologies such as enhanced jet fuels, lubricants, oils, powertrain fluids, coolants, bulk fluid treatment, monitoring, metering, storage, and distribution in support of established Army regulations and requirements. This Project improves products and technologies to optimize fuel efficiency, meet new hardware fluid requirements, modernize fluids, ensure bulk fluid meets quality requirements, and provide bulk fluid asset visibility, to optimize logistics and reduce logistics requirements. This Project executes the demonstration of enhanced jet fuels for ground systems, enhanced performance coolants, fluids for vehicle electrification, and smart bulk fuel metering and monitoring technologies. This Project improves liquid logistics products and technologies that are critical enablers for multi-domain operations requiring semi-independent operations to enable dispersed operations to extend operational reach, prolong endurance and allow freedom of action for the Joint Force.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Army Science and Technology Ground Portfolio.

Research is performed by the United States (U.S.) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Ground System Fluids and Fuels *Description:* This effort focuses on reducing the logistics footprint, improving fuel efficiency, and ensuring mobility by maturing and demonstrating technologies in areas such petroleum quality monitoring, filtration, storage and distribution, hydraulic fluids; enhanced jet fuels and fuel additives, lubricants, oil, powertrain fluids and coolants. Validates candidate engine coolants that extend change intervals, reduce corrosion, and minimize incompatibility issues for military use. Establish performance requirements for new military thermal fluids that enable emerging vehicle electrification technology. Integrate smart fuel metering technology into self-correcting devices that automatically report fuel quantity and conduct fuel filter effectiveness testing to establish fuel particle contamination limits for new fuel monitoring technology. *FY 2023 Plans:*	1.668	2.301	6.983

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BK9 *I Ground System Fluids and Fuels Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Correlate fuel lubricity additive concentration to fuel injection pump performance from the bench scale through test rig evaluation to full engine demonstrations for improved durability and operation using aviation fuels. Complete enhanced performance engine coolant candidate fluid testing and candidate down selection. Conduct testing to evaluate and establish smart meter performance baseline and initiate effort to transfer data via the server to a fuel dashboard. *FY 2024 Plans:* Will verify the fuel lubricity additive correlation from bench scale through test rig by assessing a second type of pump design; conduct field demonstration of selected engine coolants; conduct bench top testing of thermal management fluids for vehicle electrification to evaluate and down-select fluid candidates; update smart meter design based on baseline evaluation, add tank level monitoring, and assess fuel dashboard and data transfer performance. *FY 2023 to FY 2024 Increase/Decrease Statement:* Increase funding is to support investment in fuel metering to provide fuel asset visibility.			
Accomplishments/Planned Programs Subtotals	1.668	2.301	6.983

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*					**Project (Number/Name)** BL3 *I Explosives Forensics Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BL3: *Explosives Forensics Advanced Technology*	-	2.020	2.214	2.256	-	2.256	2.280	2.282	2.284	2.309	0.000	15.645
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates instrumentation and algorithms required to provide improved point, proximity, and stand-off detection of explosives and precursor materials to enable the warfighter to integrate chemical and explosive hazard detection equipment. This Project integrates explosive detection into the family of Chemical, Biological, Radiological, and Nuclear point and stand-off sensors, alternative chemical detection modalities and algorithms that will improve the probability of detection and attribution of an explosive hazard or Home-made Explosive manufacturing/assembly location.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Army Science and Technology Ground Portfolio.

Research is performed by the United States (U.S.) Army Engineer Research and Development Center and coordinated with the U.S. Army Futures Command.

Research in this Project is related to, and fully coordinated with Program Element (PE) 0602144A (Ground Technology).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Detection Mechanisms for Contaminants *Description:* This effort matures and demonstrates improved point and standoff detection of military and homemade explosives and their precursors, and other chemicals and hazardous materials. *FY 2023 Plans:* Demonstrate improved point and standoff detection of military homemade explosives and other chemical threats to facilitate chemical explosives reconnaissance focusing on integration to unmanned ground platforms. Evaluate integrated systems for semi-autonomous trace level detection of surface threats and vapor phase explosive and chemical threats. Integrate maturing technologies in hyperspectral imaging, portable mass spectrometry, and advanced optical methodologies for sensor development. *FY 2024 Plans:* Will demonstrate second generation build of Portable Chemical Fingerprint Identification System (PCFIS) for trace level chemical hazard detection of contaminated surfaces; demonstrate improved explosive and chemical vapor detection utilizing first of its	2.020	2.133	2.256

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3	R-1 Program Element (Number/Name) PE 0603119A *I Ground Advanced Technology*	Project (Number/Name) BL3 *I Explosives Forensics Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
kind waveguide enhanced Raman spectroscopy portable device; continue advancements of novel optical and non-optical sensor methodologies for trace and forensic level information more forward in the field. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.081	-
Accomplishments/Planned Programs Subtotals	2.020	2.214	2.256

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technology					Project (Number/Name) BL6 / Expedient Passive Protection Advanced Technology			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BL6: Expedient Passive Protection Advanced Technology	-	0.476	3.613	6.025	-	6.025	5.854	4.181	4.809	5.609	0.000	30.567
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates rapidly deployable protection solutions to protect small distributed units; decision support applications and software; and tactics, techniques, and procedures to increase the survivability of personnel, critical assets, and facilities from a range of threats. Force protection technologies will be matured and demonstrated for applications in complex and urban environments to protect against advanced energetic threats, large caliber rockets and missiles, and other emerging weapons.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BL5 (Expedient Passive Protection Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Army Science and Technology Ground Portfolio.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Protection Against High Trajectory Large Caliber Rocket and Missile Threats Description: This effort matures and demonstrates expedient force protection solutions for emerging threats such as large caliber rocket and missile weapon effects. This effort also demonstrates decision support tools to aid the warfighter in selecting protection schemes for survivability from emerging threats supporting All-Domain/Multi-Domain Operations.	0.458	-	-
Title: Assessments of Solutions for Survivability from Emerging Threats Demonstrations Description: This effort matures and demonstrates both legacy and newly developed expedient force protection solutions for emerging threats such as large caliber rocket and missile weapon effects and UAV threats. This effort also demonstrates algorithms for decision support applications and software; and inform tactics, techniques, and procedures (TTP's) to increase the survivability of personnel, critical assets, and facilities against emerging threats to enable the Warfighter to select protection schemes for survivability from emerging threats supporting Multi-Domain Operations. FY 2023 Plans:	-	3.546	6.025

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BL6 *I Expedient Passive Protection Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Mature and demonstrate rapidly deployable protection systems (expedient barriers, expedient personnel shelters, and expeditionary bunkers) to protect critical semi-fixed assets and facilities from emerging threats such as large caliber rockets and missiles to establish baseline performance so these systems can be optimized to provide tailored protection. ***FY 2024 Plans:*** Will optimize protective designs of expedient protective structures; will demonstrate capabilities of expedient protective structures to defeat blast and fragmentation effects of emerging threats; and will demonstrate fast-running algorithms to predict emerging threat effects. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects investments required to conduct field demonstrations to evaluate rapidly deployable retrofits and expedient protective structures.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	0.018	0.067	-
Accomplishments/Planned Programs Subtotals	0.476	3.613	6.025

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*				**Project (Number/Name)** BL8 *I Power Projection in A2AD Environments Adv Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BL8: *Power Projection in A2AD Environments Adv Tech*	-	2.862	4.948	3.317	-	3.317	4.124	2.677	3.727	4.413	0.000	26.068
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates remote assessment technologies to determine entry and maneuver corridors, provides site selection tools and decision support technologies for all climates in all season conditions including aviation site- selection tools, enhanced automated route reconnaissance technologies, mobility models for extreme climates, and road capacity assessment technologies. These technologies reduce reliance on manned on-site reconnaissance for force projection assessments and provide all-season predictions to ensure air and ground battlespace entry and maneuver. This Project also matures and demonstrates material solutions to repair, rebuild, and construct infrastructure required for movement and maneuver in highly contested, complex operational environments such as Anti-Access/Area Denial.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BL7 (Power Projection in A2AD Environments Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Army Science and Technology Ground Portfolio.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Entry and Sustainment in Complex Contested Environments Demonstrations	1.465	3.242	-
Description: This effort matures and demonstrates geospatial planning tools to expand engineering analysis of ground surfaces for entry, sustainment, and maneuver operations and to automate processes for selecting suitable maneuver corridors. ***FY 2023 Plans:*** Mature and demonstrate planning capabilities for predicting route deterioration from military ground vehicles; and demonstrate methods for assessing ground mobility across snow-covered terrain and thawing artic soils to inform Army tactics, techniques, and procedures (TTP). ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects the planned lifecycle conclusion for this effort with transition of technologies to United States Army Maneuver Support Center of Excellence.			
Title: Engineering for Battlespace Maneuver Demonstrations	1.289	1.601	3.317

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BL8 *I Power Projection in A2AD Environments Adv Tech*		

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort demonstrates material solutions and techniques for expedient repair to rapidly repair and upgrade damaged infrastructure along mobility corridors and restaging areas to maintain and enhance freedom of maneuver achieving overmatch and tactical advantage in contested complex environments. *FY 2023 Plans:* Demonstrate effectiveness of material additives for stabilizing reclaimed pavement materials; mature and demonstrate equipment solutions for expedient road repair. *FY 2024 Plans:* Will demonstrate mechanical reinforcing materials for ground / soil stabilization; demonstrate matting solutions for supporting military vehicle loads over soft soils; finalize techniques for chemical soil stabilization agents. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort required to conduct a large-scale field validation exercise to demonstrate new mechanical stabilization techniques.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	0.108	0.105	-
Accomplishments/Planned Programs Subtotals	2.862	4.948	3.317

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*				**Project (Number/Name)** BM1 *I Protection from Advanced Weapon Effects Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BM1: *Protection from Advanced Weapon Effects Adv Tech*	-	5.654	4.856	4.937	-	4.937	5.132	5.336	5.531	3.972	0.000	35.418
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates structural hardening solutions and force protection technologies to increase survivability of facilities and provide critical updates to protective design specifications and guidance. Additionally, this project matures and demonstrates passive protection technologies and provides protective design criteria advancements to mitigate attack from emerging advanced threats.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BL9 (Protection from Advanced Weapon Effects Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Army Science and Technology Ground portfolio.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Defeat of Complex Attack Demonstrations	5.440	4.787	-
Description: This effort demonstrates force protection technologies that mitigate the effects of emerging peer and near peer adversaries advanced penetrating threats and high yield blast effects by optimizing high-performance, logistically feasible material solutions and processes. *FY 2023 Plans:* Demonstrate full scale structural hardening solution against emerging complex weapon attack scenario. Demonstrate enhanced algorithm for structural hardening and damage prediction from peer and near peer adversaries' precision strike penetrating weapons. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle completion of this effort with transition of technologies to United States Army Corps of Engineers Protective Design Center and to United States Air Force Research Laboratory, Munitions Directorate.			
Title: SBIR/STTR Transfer	0.214	0.069	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BM1 *I Protection from Advanced Weapon Effects Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638			
Title: Protection from Advanced Penetrators Demonstration ***Description:*** This effort matures and demonstrates passive protective designs and concepts for hardened structures and critical assets that mitigate the effects of advanced precision threat weapons of peer and near peer adversaries through focused subscale to full-scale demonstrations. ***FY 2024 Plans:*** Will demonstrate protection of current structural hardening solutions against a sub-scale advanced penetrator to provide baseline performance and to identify and investigate current facility criteria deficiencies for advanced penetrating weapons. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This is a new effort in FY 2024 progressing from the Defeat of Complex Attack Demonstrations effort.	-	-	4.937
Accomplishments/Planned Programs Subtotals	5.654	4.856	4.937

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks
 N/A

D. Acquisition Strategy
 N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*						**Project (Number/Name)** BO3 *I MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*			

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BO3: *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*	-	259.100	383.300	-	-	-	-	-	-	-	0.000	642.400
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Interest Item funding provided for Military Engineering Technology Demonstration.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Electrical System Safety and Reliability	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Electrical System Safety and Reliability		
Congressional Add: Cold Regions Research	2.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Cold Weather Research Station		
Congressional Add: High-Performance Concrete Technology	6.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for High-Performance Contrete		
Congressional Add: Secure Management of Energy Generation and Storage	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Secure Management of Energy Generation and Storage		
FY 2023 Plans: Congressional Interest Item funding provided for Secure Management of Energy Generation and Storage.		
Congressional Add: Composite Flywheel Technology	7.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Composite Flywheel Technology		
Congressional Add: Materials and Manufacturing Technology for Cold Environments	4.000	4.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BO3 *I MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Materials and Manufacturing Technology for Cold Environments *FY 2023 Plans:* Congressional Interest Item funding provided for Materials and Manufacturing Technology for Cold Environments.		
Congressional Add: Program Increase - Rapid Entry and Sustainment for the Arctic	8.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Rapid Entry and Sustainment for the Arctic *FY 2023 Plans:* Congressional Interest Item funding provided for Rapid Entry and Sustainment for the Arctic.		
Congressional Add: Program Increase - Water Quality and Resiliency	5.000	7.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Water Quality and Resiliency Technologies *FY 2023 Plans:* Congressional Interest Item funding provided for Water Quality and Resiliency Technologies.		
Congressional Add: Program Increase - Organic Light Emitting Diode	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Organic Light Emitting Diode		
Congressional Add: Program Increase - Infrastructure Resilience and Flood Assessment	3.500	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Infrastructure Resilience and Flood Assessment		
Congressional Add: Program Increase - Clean Modular Hydro Technology	8.000	20.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Clean Modular Hydro Technology. *FY 2023 Plans:* Congressional Interest Item funding provided for Clean Modular Hydro Technology		
Congressional Add: Program Increase - Accelerator Technology for Ground Maneuver	5.000	4.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Accelerator Technology for Ground Maneuver *FY 2023 Plans:* Congressional Interest Item funding provided for Accelerator Technology for Ground Maneuver.		
Congressional Add: Program increase - Autonomous Combat Engineering Solutions	4.000	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** BO3 *I MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions		
Congressional Add: Program Increase - Coastal Terrain Hazard Research	6.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Coastal Terrain Hazard Research		
Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology	5.000	6.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Impacts of Soil Structures on Hydrology		
FY 2023 Plans: Congressional Interest Item funding provided for Impacts of Soil Structures on Hydrology.		
Congressional Add: Program Increase - Cross-Laminated Timber and Recycled Carbon Fiber Materials	5.500	5.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Cross-Laminated Timber and Recycled Carbon Fiber Materials		
FY 2023 Plans: Congressional Interest Item funding provided for Cross-Laminated Timber and Recycled Carbon Fiber Materials.		
Congressional Add: 3D Printing of Concrete	2.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for 3D Printing of Concrete		
Congressional Add: 3D Printing of Infrastructure	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for 3D Printing of Infrastructure		
Congressional Add: Additive Construction for Field Deployment	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Additive Construction for Field Deployment		
Congressional Add: Anticipating Threats to Natural Systems	5.000	6.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Anticipating Threats to Natural Systems		
FY 2023 Plans: Congressional Interest Item funding provided for Anticipating Threats to Natural Systems.		
Congressional Add: Army Visual and Tactical Arctic Reconnaissance	2.000	4.000

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Army Visual and Tactical Arctic Reconnaissance		
FY 2023 Plans: Congressional Interest Item funding provided for Army Visual and Tactical Arctic Reconnaissance.		
Congressional Add: Assessments and Monitoring Systems for Historic Structures	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Assessments and Monitoring Systems for Historic Structures		
Congressional Add: Autonomous Construction and Manufacturing	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Autonomous Construction and Manufacturing		
FY 2023 Plans: Congressional Interest Item funding provided for Autonomous Construction and Manufacturing.		
Congressional Add: Biofuel	6.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Biofuel		
Congressional Add: Biomass Polymer Technology	2.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Biomass Polymer Technology		
Congressional Add: Cold Weather Energy Research	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Cold Weather Energy Research		
Congressional Add: Cold Weather Research	3.000	4.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Cold Weather Research		
FY 2023 Plans: Congressional Interest Item funding provided for Cold Weather Research.		
Congressional Add: Distributed Technologies for Steam Loop Replacements	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Distributed Technologies for Steam Loop Replacements		
Congressional Add: Electrochemical Conversion of Water Streams	5.000	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Electrochemical Conversion of Water Streams		
Congressional Add: Entry Control Points at Installations	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Entry Control Points at Installtions		
Congressional Add: Expeditionary Additive Construction	15.000	15.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Expeditionary Additive Construction		
FY 2023 Plans: Congressional Interest Item funding provided for Expeditionary Added Construction.		
Congressional Add: Explosive Materials Detection	3.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Explosive Materials Detection		
Congressional Add: Frost Heave Effects Monitoring	4.500	6.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Frost Heave Effects Monitoring		
FY 2023 Plans: Congressional Interest Item funding provided for Frost Heave Effects Monitoring.		
Congressional Add: Graphene Applications for Military Engineering	10.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Graphene Applications for Military Engineering		
FY 2023 Plans: Congressional Interest Item funding provided for Graphene Applications for Military Engineering.		
Congressional Add: Hardened Facility Standards	4.600	5.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Hardened Facility Standards		
FY 2023 Plans: Congressional Interest Item funding provided for Hardened Facility Standards.		
Congressional Add: High Power Fast Charging for Electric Vehicle Fleets	3.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for High Power Fast Charging for Electric Vehicle Fleets		
FY 2023 Plans: Congressional Interest Item funding provided for Electric Vehicle Fleets.		
Congressional Add: Infrastructure Smart Technology	5.000	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Infrastructure Smart Technology		
Congressional Add: Low Carbon Hydrogen Technologies	10.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Low Carbon Hydrogen Technologies		
FY 2023 Plans: Congressional Interest Item funding provided for Low Carbon Hydrogen Technologies.		
Congressional Add: Microgrid Reliability and Resiliency	10.000	6.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Microgrid Reliability and Resiliency		
FY 2023 Plans: Congressional Interest Item funding provided for Microgrid Reliability and Resiliency.		
Congressional Add: Military Waste Stream Conversion	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Military Waste Stream Conversion		
FY 2023 Plans: Congressional Interest Item funding provided for Military Waste Stream Conversion		
Congressional Add: Partnership and Technology Transfer	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Partnership and Technology Transfer		
Congressional Add: Power Generation for Increased Facility Resilience Pilot	10.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Power Generation for Increased Facility Resilience Pilot		
FY 2023 Plans: Congressional Interest Item funding provided for Power Generation for Increased Facility Resilience Pilot		
Congressional Add: Power Projection	7.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Power Projection		
FY 2023 Plans: Congressional Interest Item funding provided for Power Projection.		
Congressional Add: Sustainable Smart Utilities	5.000	-

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Sustainable Smart Utilities		
Congressional Add: Water Resiliency and Self Sufficiency	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Water Resiliency and Self Sufficiency		
Congressional Add: Water Reuse Consortium	10.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Water Reuse Consortium		
FY 2023 Plans: Congressional Interest Item funding provided for Water Reuse Consortium.		
Congressional Add: Watercraft Simulator	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Watercraft Simulator		
Congressional Add: Program Increase - ADDITIVE MANUFACTURING AND 3D PRINTING FOR DEPLOYABLE SHELTERS	-	6.000
FY 2023 Plans: Congressional Interest Item funding provided for ADDITIVE MANUFACTURING AND 3D PRINTING FOR DEPLOYABLE SHELTERS		
Congressional Add: Program Increase - ADDITIVE MANUFACTURING FOR WEAPONS AND ARMAMENTS COMPONENTS	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for ADDITIVE MANUFACTURING FOR WEAPONS AND ARMAMENTS COMPONENTS		
Congressional Add: Program Increase - ADVANCED MULTI-STACK OLED MICRODISPLAYS	-	8.800
FY 2023 Plans: Congressional Interest Item funding provided for ADVANCED MULTI-STACK OLED MICRODISPLAYS		
Congressional Add: Bio-derived coatings for high-performance applications	-	2.000
FY 2023 Plans: Congressional Interest Item funding provided for bio-derived coatings for high-performance applications.		
Congressional Add: Expanding engineering with nature installation capacity	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for Engineering with Nature.		
Congressional Add: Mass timber applications for military construction projects	-	12.000

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for mass timber applications for military construction projects.		
Congressional Add: Novel materials for smart infrastructure systems	-	6.000
FY 2023 Plans: Congressional Interest Item funding provided for novel materials for smart infrastructure systems.		
Congressional Add: Rapid infrastructure development and engineering	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for novel materials for rapid infrastructure development and engineering.		
Congressional Add: Ultra-high strength steels for construction applications	-	6.000
FY 2023 Plans: Congressional Interest Item funding provided for ultra-high strength steels for construction applications.		
Congressional Add: Always ready distributed energy	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for always ready distributed energy.		
Congressional Add: Self contained power for towers and sensors	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for self contained power for towers and sensors.		
Congressional Add: Ruggedized deployable solar generators	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for ruggedized deployable solar generators.		
Congressional Add: PFAS destruction industrial SCWO technology	-	12.000
FY 2023 Plans: Congressional Interest Item funding provided for PFAS destruction industrial SCWO technology		
Congressional Add: Sorbent enhanced clean hydrogen demonstration	-	15.000
FY 2023 Plans: Congressional Interest Item funding provided for sorbent enhanced clean hydrogen demonstration.		
Congressional Add: 3D Printing of infrastructure - enabling cold weather construction capabilities	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for 3D Printing of infrastructure - enabling cold weather construction capabilities.		
Congressional Add: Advanced coating development for infrastructure	-	3.000

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for advanced coating development for infrastructure.		
Congressional Add: Arctic terrain sensing with drone platforms	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for Arctic terrain sensing with drone platforms.		
Congressional Add: Cobalt free batteries	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for cobalt free batteries.		
Congressional Add: Competition planning and evaluation infrastructure	-	8.000
FY 2023 Plans: Congressional Interest Item funding provided for competition planning and evaluation infrastructure.		
Congressional Add: Delivered fuel decarbonization and resiliency	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for delivered fuel decarbonization and resiliency.		
Congressional Add: Engineering practices for ecosystem design solutions	-	6.500
FY 2023 Plans: Congressional Interest Item funding provided for Engineering practices for ecosystem design solutions.		
Congressional Add: Innovative design and manufacturing of advanced composites/multi material protective systems	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for innovative design and manufacturing of advanced composites/multi material protective systems.		
Congressional Add: Logistically secure energy resources for resilient installation and mobility infrastructure	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for logistically secure energy resources for resilient installation and mobility infrastructure.		
Congressional Add: Military Operations in permafrost environment	-	3.500
FY 2023 Plans: Congressional Interest Item funding provided for Military Operations in permafrost environment.		
Congressional Add: Military training grounds research to support force readiness	-	7.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2023 Plans: Congressional Interest Item funding provided for Military training grounds research to support force readiness.		
Congressional Add: Operational and cyber resilient power for critical infrastructure	-	8.000
FY 2023 Plans: Congressional Interest Item funding provided for operational and cyber resilient power for critical infrastructure.		
Congressional Add: Rapid Track repair	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for Rail Road Rapid Track repair.		
Congressional Add: Solid State rechargeable lithium batteries	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for Solid State rechargeable lithium batteries.		
Congressional Add: Sustainable distributed electric vehicle charging station	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for sustainable distributed electric vehicle charging station.		
Congressional Add: Technology pilot for reliability, resilience, and energy efficiency	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for technology pilot for reliability, resilience, and energy efficiency.		
Congressional Add: Wildfire engineering for sustainability and resiliency	-	6.000
FY 2023 Plans: Congressional Interest Item funding provided for wildfire engineering for sustainability and resiliency.		
Congressional Add: Zero emission concrete	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for zero emission concrete.		
Congressional Add: National Hydrography Dataset	2.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for the National Hydrography Dataset.		
Congressional Adds Subtotals	259.100	383.300

C. Other Program Funding Summary ($ in Millions)

N/A

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C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*				**Project (Number/Name)** CJ9 *I Ground Enabling University Adv Development*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CJ9: *Ground Enabling University Adv Development*	-	3.863	3.896	4.214	-	4.214	6.036	6.137	6.140	6.207	0.000	36.493
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project matures and demonstrates advanced developments and technological innovations from academia, in the focus areas of ground autonomy, Artificial Intelligence / Machine Learning (AI/ML) and robotics, occupant/vehicle survivability and other ground platform technologies of importance to the Army, by maturing and demonstrating technologies with the goal of delivering technology to the warfighter more quickly. This Project matures and demonstrates advanced technologies with a focus on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to the next generation combat vehicles. This Project focuses on maturation and demonstration of various advanced technologies originating from extramural applied research in academia pertaining to navigation/routing, autonomous robotic vehicles with the use of artificial intelligence and machine learning as applied to ground mobility and maneuver, and other innovative ground enabling applied research technologies. This Project also matures and demonstrates advanced technologies leading to potential emerging capabilities in areas of strategic importance to the Army in autonomy, robotics and AI/ML, protection of both platform and occupant, and other ground platform technologies in propulsion, survivability, powertrain, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances.

Work in this Project complements Program Element (PE) 0620144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology) and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Robust autonomous capabilities for ground vehicles	2.136	1.887	2.128
Description: This effort demonstrates AI/ML and autonomous mobility integrated into ground vehicles to conduct off-road maneuvers to enable the transition from teleoperation to autonomous or semi-autonomous scenarios. Research is conducted in collaboration with university partners to advance autonomous mobility and protection of both occupant and platform in optionally manned and autonomous ground vehicles. *FY 2023 Plans:* Will further mature, integrate and demonstrate use of AI/ML methods that enable robust, autonomous, tactical behaviors for multi-agent air and ground vehicle teams beyond existing behaviors on common software platforms and Army experimental platforms.			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** CJ9 *I Ground Enabling University Adv Development*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will continue to mature and demonstrate emerging autonomous technologies to increase the overall system performance of the autonomy software platforms through academia. ***FY 2024 Plans:*** Matures and demonstrates multiagent air and ground vehicle teams and situational awareness, beyond existing behaviors, including teams of up to three ground vehicles and five air vehicles. Matures and demonstrates marsupial robot deployment and recovery with increased automation and intelligence. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Title: Human-robot/AI interactions ***Description:*** This effort matures, integrates, and demonstrates systems involving physical and cognitive levels of interactions between humans and robots, with the use of reinforcement machine learning which uses human feedback, learning from demonstrations, and safe human-aware controllers. Work is conducted in collaboration with university partners to advance autonomous mobility as well as other areas of ground platform technologies in propulsion, survivability, powertrain, sensing, and perception. ***FY 2023 Plans:*** Will further mature, integrate and demonstrate use of AI/ML methods to improve autonomous systems by capturing and learning from human teleoperation commands, human interventions, and other forms of human interaction. Will mature and demonstrate tactics and algorithms on common software platforms and Army experimental platforms through academia while working fully autonomously around humans for extended periods of time. ***FY 2024 Plans:*** Demonstrates AI/ML methods for robust autonomous capabilities, cooperative tactical reasoning, real-time basic feature extraction, multi-robot long-term autonomy, human-AI collaboration, human-in-the-loop ML for autonomous navigation. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.	1.727	1.867	2.086
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:***	-	0.142	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.863	3.896	4.214

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CV5: *Engineer Enablers Maneuver, LOG, & Sustainment Adv*	-	-	2.539	3.313	-	3.313	4.808	2.700	5.557	5.532	0.000	24.449
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates joint contested logistics operations technologies and provides capabilities to operate in disbursed battlefield operations and support sustainment operations through predicted dynamic scenario development that provides critical vulnerabilities assessment and methods/equipment to mitigate potential issues.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project CV3 (Engineer Enablers Maneuver, LOG, & Sustainment Apl).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Army Science and Technology Ground portfolio.

Work is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Sustainment Planning Tool	-	2.446	2.884
Description: This effort will mature and demonstrate map-based sustainment running estimates with preposition of survivable material stockpiles based on synchronized ops/intel/log running estimates and informed by artificial intelligence (AI) based edge computing analyses. *FY 2023 Plans:* Mature and optimize the existing Joint Planning Services (JPS)-developed Sustainment Quick Estimate model to connect to appropriate authoritative data sources and provide more robust capabilities for Sustainment Running Estimates (SRE). *FY 2024 Plans:* Will conduct agile design review with Program Manager Mission Command to evaluate optimized estimation model within Joint Planning Services. Will further mature and optimize with authoritative data sources in advance of integrating capability to the Command Post Computing Environment (CPCE). *FY 2023 to FY 2024 Increase/Decrease Statement:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase reflects the planned lifecycle of this effort.			
Title: Planning Logistics Analysis Network System Advanced Research	-	-	0.429
Description: This effort demonstrates new engineering applications and methodologies that support improved distributed logistics planning via multi-modal transportation networks to improve the efficiency and effectiveness of the planning decision making during contested logistics scenarios. *FY 2024 Plans:* Will improve system performance through integration of transportation throughput options through the nodes and routes. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle initiation of this effort in FY24.			
Title: SBIR/STTR Transfer	-	0.093	-
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	2.539	3.313

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
DA2: *SAFR Alternatives for Readiness Advanced Tech*	-	-	1.865	2.926	-	2.926	4.285	9.762	11.343	14.156	0.000	44.337
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates cross-cutting, safer alternative advanced technologies that enable readiness. These technologies also support product availability, Soldier and worker safety, and a reduced environmental footprint in the manufacturing, maintenance, and use of ground vehicles and other Army weapon systems. The Project matures and optimizes safer alternatives in technology areas including surface finishes, coatings, solvents, refrigerants, and fire suppressants. This research addresses the growing impacts to health and readiness associated with carcinogens such as hexavalent chromium, global warming chemicals including hydrofluorocarbons (HFCs), and forever chemicals such as like per- and polyfluoroalkyl substances (PFAS). This Project enables the Army to assess and resolve these types of emerging and continually evolving risks throughout the full life cycle of Army systems.

The effort is consistent with the Army Modernization Strategy and provides enabling technologies in support of all Cross Functional Teams.

Research in this Project is performed by the United States (U.S.) Army Combat Capabilities Development Command (DEVCOM) Army Research Laboratory, Aberdeen Proving Ground, MD; the Armaments Center, Picatinny Arsenal, NJ; the Aviation and Missile Center, Huntsville, AL; the Soldier Center, Natick, MA; and the Ground Vehicle Systems Center, Warren, MI; and is coordinated with the United States (U.S.) Army Futures Command.

This Project complements and transitions technologies developed under Program Element (PE) 0602144A (Ground Technology).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Safer Alternatives for Readiness (SAFR) Advanced Technology	-	1.797	2.926
Description: Demonstrate safer alternative advanced technologies to replace hexavalent chromium, cadmium and other harmful chemicals during surface finishing; reduce the use of volatile organic compounds and other hazardous materials in coating and depainting processes; and ensure the availability of compatible next generation refrigerants and fire suppressants with low global warming potential. *FY 2023 Plans:* Demonstrate advanced non-chromium surface finishing techniques for use on ground systems; will mature non-chemical depainting alternatives to n-methyl pyrrolidone; and optimize the performance of HFC alternatives against military-unique requirements for refrigerants and fire suppressants. *FY 2024 Plans:*			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will mature lead-free rocket motor propellants; demonstrate novel nitration methods for energetic materials; optimize more efficient fuels and lubricants to reduce emissions. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.068	-
Accomplishments/Planned Programs Subtotals	-	1.865	2.926

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*			**Project (Number/Name)** DG2 *I Advanced Development of Obscurants*				
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
DG2: *Advanced Development of Obscurants*	-	-	-	2.825	-	2.825	-	-	-	-	0.000	2.825
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2024, funding realigned from Program Element 0603119 / Project BG9 (Obscuration Advanced Technology)

A. Mission Description and Budget Item Justification

The Project matures and demonstrates obscurant technologies with potential to enhance personnel and platform survivability by degrading threat force surveillance sensors and defeating the enemy's target acquisition devices, missile guidance, and directed energy weapons. Dissemination systems for new and improved obscurants are developed with the goal of providing efficient and safe screening of deployed forces.

Work in this Project compliments Program Element (PE) 0602144 (Ground Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Work is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Advanced Obscuration	-	-	2.825
Description: This effort matures and demonstrates the dissemination of new and advanced obscurants. *FY 2024 Plans:* Will further explore bi-spectral, millimeter wave, and multi-spectral obscurant materials; explore cost effective methods for material drying and packaging in order to further enhance performance against current capability for potential implementation into existing obscuration systems and examining the feasibility of use in future systems currently in development. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding in this effort is realigned from Program Element 0603462 / Project BG9 (Obscuration Advanced Technology)			
Accomplishments/Planned Programs Subtotals	-	-	2.825

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*	**Project (Number/Name)** DG2 *I Advanced Development of Obscurants*

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

PE 0603119A: *Ground Advanced Technology*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*						**R-1 Program Element (Number/Name)** PE 0603134A *I Counter Improvised-Threat Simulation*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	23.920	21.486	21.672	-	21.672	21.680	21.968	21.983	22.223	0.000	154.932
CD3: *Counter Improvised-Threat Simulation*	-	23.920	21.486	21.672	-	21.672	21.680	21.968	21.983	22.223	0.000	154.932

A. Mission Description and Budget Item Justification

This Program Element (PE) develops technology for detecting and defeating Improvised Explosive Devices (IEDs). The goal of this research is to increase the ability of deployed forces to positively identify IEDs with minimal false alarms and positively neutralize or mitigate the effects of IEDs with minimal collateral damage.

This PE is executed by the Army Futures Command (AFC) in coordination with the Under Secretary of Defense for Research and Engineering (USD/R&E) and the Defense Threat Reduction Agency (DTRA).

B. Program Change Summary ($ in Millions)

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	24.747	21.486	21.571	-	21.571
Current President's Budget	23.920	21.486	21.672	-	21.672
Total Adjustments	-0.827	0.000	0.101	-	0.101
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.827	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.101	-	0.101

Change Summary Explanation

Increased funding due to revised economic assumptions.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603134A *I Counter Improvised-Threat Simulation*				**Project (Number/Name)** CD3 *I Counter Improvised-Threat Simulation*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CD3: *Counter Improvised-Threat Simulation*	-	23.920	21.486	21.672	-	21.672	21.680	21.968	21.983	22.223	0.000	154.932
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops technology for detecting and defeating improvised explosive devices (IEDs). The goal of this research is to increase the ability of deployed forces to positively identify IEDs with minimal false alarms and increase the rate of advance of deployed forces as well as to identify vehicle and personnel borne IEDs at fixed sites. Additionally the objective is to positively neutralize or mitigate the effects of IEDs with minimal collateral damage.

This Project is executed by the Army Futures Command (AFC) in coordination with the Under Secretary of Defense for Research and Engineering (USD/R&E) and the Defense Threat Reduction Agency (DTRA).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Standoff Detection of IED Threats in All Environments	9.804	9.791	10.221

Description: This effort develops technology to detect IED threats at standoff distances. Technologies include electro-optical, radar, light detection and ranging (LIDAR), atomic magnetometer and other technologies applicable to detecting IEDs and their components that can be integrated on dismounted Soldiers, ground, water-based and aerial systems or at fixed sites. This effort also develops technologies and network techniques to detect the electronic signature of radio-controlled IEDs. Technologies will be validated on their ability to detect IEDs and their components within infrastructure, on or under ground and water, and attached to vehicles or personnel. The goal for these technologies is to achieve high probabilities of detection while minimizing false alarms from naturally occurring and man-made entities.

FY 2023 Plans:
Optimize electro-optical/infrared (EO/IR), electromagnetic (EM), neutron-gamma and radio frequency sensor technologies applicable to detecting IEDs and their components in simulated field environments. Integrate sensor technologies on Soldier-borne, ground, and aerial platforms or at fixed sites to validate IED detection performance. Demonstrate and assess detection of IEDs or their components when buried, camouflaged or attached to vehicles or personnel in various operational conditions.

FY 2024 Plans:
Will mature EO/IR, EM, neutron-gamma, and RF sensor technologies to improve detection performance of highly obscured IEDs in a broad range of emplacement scenarios and environments; integrate sensor technologies on Soldier-borne, ground, and aerial

PE 0603134A: *Counter Improvised-Threat Simulation*
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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603134A *I Counter Improvised-Threat Simulation*	**Project (Number/Name)** CD3 *I Counter Improvised-Threat Simulation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
platforms or at fixed sites; demonstrate and assess detection of IEDs configured as vehicle borne IEDs and personnel borne IEDs in various operational conditions while improving form factor and cost considerations. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Title: IED Neutralization, Prevention and Mitigation ***Description:*** This effort develops technology critical to neutralizing and mitigating the effects of IEDs at standoff distances. Technologies include directed energy sources, energetic or kinetic effectors, encasement of the threat and Soldier, platform and base protection technologies. These technologies will be demonstrated to neutralize IEDs in place and protect soldiers and equipment from the effects of IEDs. This effort also explores advanced techniques to robotically manipulate IEDs. The goal for these technologies is to achieve high probabilities of avoiding the IED's effects by friendly forces. ***FY 2023 Plans:*** Validate energetic and directed energy technologies to neutralize IEDs or mitigate IED effects. Continue to demonstrate novel C-IED mitigation capabilities in militarily relevant environments. ***FY 2024 Plans:*** Will mature and validate kinetic, jamming, and directed energy neutralization technologies to increase neutralization and mitigation performance to reduce impacts to maneuver speeds; demonstrate novel C-IED mitigation capabilities in militarily relevant scenarios in additional environments. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.	4.833	2.948	3.138
Title: Enabling C-IED Technologies ***Description:*** This effort develops technologies that support the detection, prevention, neutralization and mitigation of IED threats. Technologies exploit data sciences including sensor processing algorithms, integration of sensor data, data processing and analytics, threat forecasting, and autonomous maneuver. Techniques will be demonstrated that determine detection of IED threats and identify trends to forecast probabilities of encountering or attributing IEDs based on operational data and machine learning techniques. The goals for these technologies are to achieve high probabilities of detecting, predicting and attributing IEDs threats. ***FY 2023 Plans:*** Validate advanced sensor processing techniques and their ability to detect IED threats with reduced false alarms. Exploit foreign partner sources and existing U.S. data repositories to optimize emerging IED threat data sets in varying environments and	9.283	8.043	8.313

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603134A *I Counter Improvised-Threat Simulation*	**Project (Number/Name)** CD3 *I Counter Improvised-Threat Simulation*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
develop new signature attributes that span multiple sensor modalities. Validate machine learning and emerging data analysis techniques to autonomously detect threats with limited operator input. *FY 2024 Plans:* Will demonstrate lower size, weight, and power sensor components and improved processing techniques to detect IED threats with reduced false alarms; leverage threat data from foreign partners and use existing U.S. threat data repositories to optimize, develop, and mature new IED signature attributes in varying environments for multiple sensor modalities; demonstrate artificial intelligence and machine learning techniques to increase autonomous detection capability and reduce operator burden. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.704	-
Accomplishments/Planned Programs Subtotals	23.920	21.486	21.672

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											Date: March 2023	

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	PE 0603386A *I Biotechnology for Materials - Advanced Research*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	51.774	56.853	59.871	-	59.871	36.840	25.208	25.225	25.500	0.000	281.271
CP7: *Biotechnology Demonstration and Evaluation*	-	51.774	56.853	59.871	-	59.871	36.840	25.208	25.225	25.500	0.000	281.271

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates novel biotechnological methods, processes, and materials to enhance military supply chain resilience. The Army is responsible for centrally managing funding for Tri-Service Biotechnology for a Resilient Supply Chain (T-BRSC) efforts. T-BRSC leverages bio-industrial manufacturing to ensure critical domestic supply chain resilience for defense needs through domestic production of raw materials and critical products. The Army supports this Tri-Service effort under this PE with collaboration among sister Services and select allied partners to support a robust pipeline for biotechnology related manufacturing. Advanced research projects optimize and rapidly demonstrate future novel biotechnologies for disruptive breakthrough capabilities. This PE provides bio-engineered and biosynthetic materials to ensure domestic sourcing of critical products in the defense supply chain. Also under this PE, efforts mature and demonstrate rapid prototyping methods for rapid testing of bio-derived materials as well as optimize models for the design and bio-security of bio-engineered materials for defense applications.

This PE is coordinated with PE 0602386A (Biotechnology for Materials - Applied Research).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this PE is performed by the United States (US) Army Futures Command (AFC).

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	53.736	56.853	38.881	-	38.881
Current President's Budget	51.774	56.853	59.871	-	59.871
Total Adjustments	-1.962	0.000	20.990	-	20.990
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.962	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	20.990	-	20.990

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Exhibit R-2, **RDT&E Budget Item Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603386A I *Biotechnology for Materials - Advanced Research*	

Change Summary Explanation

Increase is due to the fact that additional technology demonstrations have to be conducted prior to transition to BA4.

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603386A *I Biotechnology for Materials - Advanced Research*			**Project (Number/Name)** CP7 *I Biotechnology Demonstration and Evaluation*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CP7: *Biotechnology Demonstration and Evaluation*	-	51.774	56.853	59.871	-	59.871	36.840	25.208	25.225	25.500	0.000	281.271
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project collaborates with Joint Service partners to mature, optimize, and demonstrate novel biotechnologies and related methods to establish a domestic resilient supply chain for defense needs. Advanced research validates and provides bio-derived, bio-functionalized, and bio-manufactured materials. This Project matures and demonstrates high-throughput screening and small-scale prototyping, enhances material performance, and exploits biotechnologies to provide drop-in replacements and materials with enhanced properties for defense applications. Areas of focus may include high density, high performance fuels for high speed weapons, bio-based propellants, optical materials, and bio-derived systems that sense and respond to the presence of contaminants.

Work in this Project compliments Program Element (PE) 0602386A (Biotechnology for Materials - Applied Research) / CP6 (Foundational Biotechnology Design and Dev).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Biosynthetic Material Demonstration ***Description:*** This task matures and demonstrates novel and emerging biotechnologies related to bio-engineered or bio-manufactured materials to address vulnerabilities in the critical material supply chain for military needs. ***FY 2023 Plans:*** * Optimize and expand the Tri-Service capability for rapid maturation, demonstration, and evaluation of bio-products for defense applications by exploiting the use of robotics for semi-autonomous capabilities. This Tri-Service capability will support the rapid assessment of biotechnology solutions and biotechnologically derived materials with cutting-edge instrumentation. * Optimize bio-manufacturing methods and demonstrate the production of materials for defense needs at reduced cost compared to commercial sources to provide an alternative means of sourcing critical materials. Demonstrate the methods for the large scale bio-manufacture of a drop-in replacement high performance fuel blend to support high speed weapons in hypersonic flight.	51.774	54.778	59.871

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603386A I *Biotechnology for Materials - Advanced Research*	**Project (Number/Name)** CP7 I *Biotechnology Demonstration and Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
* Optimize bio-manufacturing methods and capabilities for the production of a fire-resistant coating for high-temperature, fire-resistant composite materials supporting long-range missile cases and hypersonic flight. The result will be a bio-manufactured materials with improved performance that can be exploited as a viable resource for Warfighter dominance. *FY 2024 Plans:* * Will utilize Tri-Service capability for rapid maturation, demonstration, and optimization of bio-products for defense applications by exploiting the use of robotics for semi-autonomous capabilities to develop new biomanufacturing platform strains. Rapidly assess the ability of new strains to provide a biotechnology solutions and biotechnologically derived materials. * Scale-up the production of biomolecules for use as energetic materials in hypersonic systems at volumes suitable for advanced prototyping and testing. Validate the performance of these materials to support enhanced weapon systems range, increased speeds, potential reusability, and supply security on relevant platforms. * Mature and demonstrate the bio-manufacturing process development for domestic production of high temperature resistant bio-manufactured materials necessary for new hypersonic defense systems, unmanned aerial vehicles (UAVs) and fire-resistant casings for batteries. * Improve the performance of biotechnology product production and downstream processing activities in high hazard operations. Optimize the biotechnology production data management, and process control software. * Demonstrate the production of bio-manufactured aviation and ground vehicle critical materials from in-theater waste streams. Optimize the organic solution to provide fuel in theater to maintain a capable fighting force and persist inside actively contested spaces from a sustainable and secure production system. * Demonstrate reduced logistics through biocementation technology for expeditionary basing needs. * Mature and demonstrate a biomanufactured non-hazardous solvents for use in stripping and cleaning applications for ground, air, and marine applications. * Demonstrate optical materials for agile laser protection of goggles, vision blocks, and sensor systems. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of the effort.			
Title: SBIR/STTR	-	2.075	-

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| **Exhibit R-2A**, RDT&E Project Justification: PB 2024 Army | | **Date:** March 2023 | |
| **Appropriation/Budget Activity**
2040 *I* 3 | **R-1 Program Element (Number/Name)**
PE 0603386A *I Biotechnology for Materials - Advanced Research* | **Project (Number/Name)**
CP7 *I Biotechnology Demonstration and Evaluation* | |

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	51.774	56.853	59.871

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

PE 0603386A: *Biotechnology for Materials - Advanced R...*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603457A / *C3I Cyber Advanced Development*							
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	61.426	41.354	28.847	-	28.847	19.204	22.235	27.077	36.373	0.000	236.516
6CY: *Autonomous Cyber Advanced Technology*	-	9.304	11.188	7.528	-	7.528	4.629	11.907	16.867	26.035	0.000	87.458
8CY: *Information Trust Advanced Technology*	-	15.876	20.028	11.187	-	11.187	4.180	-	-	-	0.000	51.271
9CY: *Network Access and Effects Advanced Technology*	-	4.347	8.170	10.132	-	10.132	10.395	10.328	10.210	10.338	0.000	63.920
CB4: *Offensive Cyber Operations (OCO) Mirror Adv Tech*	-	1.899	1.968	-	-	-	-	-	-	-	0.000	3.867
CB6: *C3I Cyber Advanced Development (CA)*	-	30.000	-	-	-	-	-	-	-	-	0.000	30.000

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates technologies for offensive and defensive cyber operations in tactical environments. Projects optimize devices, techniques, services, software and algorithms to enable cyber situational understanding and Cyber Electromagnetic Activities (CEMA). For offensive cyber, efforts demonstrate integrated electronic attack (EA) and CEMA hardware and software to execute force protection (FP), EA, electronic surveillance (ES), signals intelligence (SIGINT), electronic warfare (EW) and cyber missions in a dynamic, distributed and coordinated fashion. For defensive cyber, efforts demonstrate hardware and software to protect tactical wired and wireless networks against modern cyber attacks and focuses on configuration, operation, monitoring, data integrity, and defense in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions.

This PE directly supports the Network Army Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army				**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603457A *I C3I Cyber Advanced Development*

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	61.426	41.354	28.720	-	28.720
Current President's Budget	61.426	41.354	28.847	-	28.847
Total Adjustments	0.000	0.000	0.127	-	0.127
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.127	-	0.127

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: CB6: *C3I Cyber Advanced Development (CA)*		
Congressional Add: *Program Increase - High Bandwidth Cryptomodule Enhancements and Certification*	30.000	-
Congressional Add Subtotals for Project: CB6	30.000	-
Congressional Add Totals for all Projects	30.000	-

Change Summary Explanation
Increased funding due to revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603457A *I C3I Cyber Advanced Development*				**Project (Number/Name)** 6CY *I Autonomous Cyber Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
6CY: *Autonomous Cyber Advanced Technology*	-	9.304	11.188	7.528	-	7.528	4.629	11.907	16.867	26.035	0.000	87.458
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates defensive effects to adversarial use of artificial intelligence (AI) and machine learning (ML) to avoid detection and deceive our automated technologies driving the network decisions. This Project also provides cyber autonomy through science & technology advancements.

Work in this Project complements Program Element (PE) 0602213A (C3I Applied Cyber) / Project CY6 (Autonomous Cyber Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Autonomous Cyber ***Description:*** This effort will develop proof-of-concept sensors that can adapt to and autonomously react to adversary cyber-attack and develop a cyber response course of action decision aid for cyber defenders to validate suitability of actions and to speed response decisions. ***FY 2023 Plans:*** Mature and demonstrate AI/ML based cyber defense decision aid architecture supporting warfighter planning at a soldier run exercise; mature and demonstrate sensors that can adapt to and autonomously react to adversary cyber-attack at a soldier run exercise; mature Generative network algorithms and neural network software to simulate adversarial attacks on AI/ML algorithms along with defenses against such attacks to ensure trustworthiness of autonomous decision engines and mitigate vulnerable decisions, as well as demonstrate these capabilities in lab and field based demonstrations; mature cyber machine learning architecture to ensure the machine learning software can interoperate and be updated in tactical environment, which will be demonstrated in lab and field based demonstrations. ***FY 2024 Plans:*** Will conduct final demonstration of hierarchical machine learning reference architecture supporting standardization of cyber capabilities that proactively react to and defend against advanced cyber threats and machine learning-enabled cyber-attacks to	9.304	11.188	7.528

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603457A *I C3I Cyber Advanced Development*	**Project (Number/Name)** 6CY *I Autonomous Cyber Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
protect the network; conduct final assessment of the detection tools and autonomous decision-making system using adversarial attack simulation software tools to detect and self-mitigate any system vulnerabilities. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned conclusion of multiple demonstrations required to validate and mature decision aid architectures, adaptive sensors and generative network algorithms for a final demonstration and assessment in FY24.			
Accomplishments/Planned Programs Subtotals	9.304	11.188	7.528

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603457A / C3I Cyber Advanced Development				**Project (Number/Name)** 8CY / Information Trust Advanced Technology			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
8CY: *Information Trust Advanced Technology*	-	15.876	20.028	11.187	-	11.187	4.180	-	-	-	0.000	51.271
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates enhanced awareness of the information's "provenance" from originator to consumer (e.g. sensor to shooter) in the presence of cyber-attacks, such as an attempt to manipulate data traversing the network.

Work in this Project complements Program Element (PE) 06022213A (C3I Applied Cyber) / Project 2CY (Information Trust Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: Information Trust Advanced Technology	4.507	6.532	7.119

Description: This Project demonstrates enhanced awareness of the information's "provenance" from originator to consumer (e.g. sensor to shooter) in the presence of cyber-attacks, such as an attempt to manipulate data traversing the network.

FY 2023 Plans:
Continue to mature and demonstrate the specification based fixed format message checking and machine learning based integrity services that ensure the integrity of messages data, origin, and chain of custody as it traverses the network; optimize specification based and machine learning based integrity services and will demonstrate within high fidelity cyber emulation environment; continue to implement and mature technology to create a suitable de-centralized lightweight blockchain algorithm that can be leveraged to ensure a secure distributed ledger of messages and associated risk with automated analysis of attempted malicious modification; optimize the lightweight blockchain technology within a high fidelity cyber emulation environment; implement and mature technology to create a trust score architecture that provides a real-time and quantitative analytics based level of trustworthiness upon the data received from the integrity, authentication, and provenance tracker services.

FY 2024 Plans:
Will demonstrate a complimentary suite of software capabilities to ensure the integrity, authenticity and provenance of data traversing the tactical network; provide a machine learning based integrity service to ensure chain of custody, a blockchain-

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603457A I *C3I Cyber Advanced Development*	**Project (Number/Name)** 8CY I *Information Trust Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
enabled provenance tracker software, enabling automatic modification detection, and a trust score architecture for real-time, quantitative, analytics-based trustworthiness of messages and other data in transit in the presence of cyber attacks. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase will enable the demonstration of the authentication service.			
Title: Agile Virtual Enclave *Description:* This effort matures and demonstrates a Multi-Level Security (MLS) Access Guard to reduce hardware infrastructure required for US Government owned systems and develop a Mission Partner Environment (MPE) transfer cross domain solution (CDS) to enable data sharing with coalition partners. *FY 2023 Plans:* Continue development of a software solution for Army Mission Command (MC) systems to achieve secure and operationally adjustable data exchange between US Armed Forces tactical systems and MPE connected systems; mature Access and Transfer Guard components; conduct lab and field-based risk reduction activities; demonstrate and assess technology readiness levels for the integrated solution in a relevant environment and address Program Manager (PM) MC and National Security Agency (NSA) concerns prior to transition. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned conclusion of this effort and transition to PEO C3T, PM Mission Command, Command Post Computing Environment POR.	11.369	13.496	-
Title: PKI-Modernization/Dynamic Access Control for Tactical (DAC-T) *Description:* This effort will mature and demonstrate cryptographic algorithms that address Program Manager (PM) Mission Command (MC) gap of native ability to support PKI digital signature and Online Certificate Status Protocol (OCSP) certificate validation for the Variable Message Format (VMF) standard MIL-STD-2045-47001D in Disconnected, Interrupted, and Low-bandwidth (DIL) Networks. Furthermore, the effort will also mature and demonstrate dynamic fine-grained access control that migrates the Army from a network-centric to data-centric access control in alignment with Advanced zero trust principles by enhancing, speeding up and automating account provisioning and access for people and non-Person entities (NPE) (e.g., sensors, devices, web services, etc.). This will significantly reduce the workload/ burden for the soldier and improve the networks security posture by enforcing least privilege & just-in-time network access. *FY 2024 Plans:*	-	-	4.068

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603457A / *C3I Cyber Advanced Development*	**Project (Number/Name)** 8CY / *Information Trust Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will optimize PM MC cryptographic algorithms and Online Certificate Status Protocol (OCSP) certificate validation capability and conduct lab-based risk reduction to demonstrate and assess PKI Modernization impacts on Mounted Mission Command's (MMCs) ability to send digitally signed VMF messages; provide recommended courses of action to the current MIL-STD-2045-47001E. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned initiation of this effort			
Accomplishments/Planned Programs Subtotals	15.876	20.028	11.187

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603457A I *C3I Cyber Advanced Development*					**Project (Number/Name)** 9CY I *Network Access and Effects Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
9CY: *Network Access and Effects Advanced Technology*	-	4.347	8.170	10.132	-	10.132	10.395	10.328	10.210	10.338	0.000	63.920
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced mission management tools and workflows, to promote efficient selection and sequencing of effects to support the agile deployment and execution of Offensive Cyber Operations (OCO) / Radio Frequency (RF) Enabled capabilities.

Work in this Project complements Program Element (PE) 0602213A (C3I Applied Cyber) / Project 3CY (Network Access and Effects Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Offensive Cyber Enabling Mission Support *Description:* This effort matures and demonstrates advanced mission management tools and workflows, to promote efficient selection and sequencing of effects to support the agile deployment and execution of OCO / RF Enabled capabilities. *FY 2023 Plans:* Will demonstrate assisted technique development to reduce time to vector discovery via software transition. Will mature and demonstrate OCO/RF enabled effect technologies against priority target of interest. Will optimize the use of OCO/RF firing platforms against near-peer targets of interest with a scaled process while minimizing manual processing and operator burden. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned conclusion of this effort and transition to the program of record.	4.347	8.170	-
Title: Network Exploitation Research and Development (NERD) Advanced Technology *Description:* This effort will mature computer assisted/automated development of Offensive Cyber Operations (OCO)/Radio Frequency (RF) enabled effects against emerging and validated targets of interest (TOI) in conjunction with exploration of non-traditional attack vectors. Will mature automated mission planning and staging methodologies and tools to evaluate and compare various courses of actions that are dynamically replicated within appropriate rapid response environment to enable both mission	-	-	10.132

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603457A / C3I Cyber Advanced Development	**Project (Number/Name)** 9CY / Network Access and Effects Advanced Technology

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
planner and operators to cognitively keep pace with the complexity of near-peer engagements within Multi-Domain Operations (MDO). *FY 2024 Plans:* Will begin development of Non-Traditional Offensive Cyber Operations (OCO)/Radio Frequency (RF) enabled access and effects that account for and circumvent modern cyber security practices against expanded targets of interest; initiate development of tools to augment and automate vulnerability exploitation as well as access and effect capability development to reduce offensive cyber and RF enabled mission timelines. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned initiation of this effort.			
Accomplishments/Planned Programs Subtotals	4.347	8.170	10.132

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603457A *I C3I Cyber Advanced Development*					**Project (Number/Name)** CB4 *I Offensive Cyber Operations (OCO) Mirror Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CB4: *Offensive Cyber Operations (OCO) Mirror Adv Tech*	-	1.899	1.968	-	-	-	-	-	-	-	0.000	3.867
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates methods, tools and techniques to enable rapid instantiation of an operationally relevant cyberspace environment supporting critical Offensive Cyber Operations (OCO) mission functions to include but not limited to development, exercise, mission rehearsal and provide technical reach back to units during operations.

Work in this Project complements Program Element (PE) 0602213A (C3I Applied Cyber) / Project 5CY (Offensive Cyber Operations (OCO) Mirror Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Offensive Cyber Operations Mirror	1.899	1.968	-
Description: This effort matures and demonstrates methods, tools, and techniques to enable rapid instantiation of an operationally relevant cyberspace environment supporting critical OCO mission functions to include but not limited to development, exercise, mission rehearsal and provide technical reach back to units during operations. *FY 2023 Plans:* Demonstrate OCO Mirror Rev 3 product at annual Cyber Blitz test event. Transition OCO Mirror product Rev 3 at technology readiness level (TRL) 6. All OCO Mirror products will receive authorization to operate (ATO) on Top Secret level information systems. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned conclusion of this effort and transition to the program of record.			
Accomplishments/Planned Programs Subtotals	1.899	1.968	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603457A *I C3I Cyber Advanced Development*	**Project (Number/Name)** CB4 *I Offensive Cyber Operations (OCO) Mirror Adv Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603457A *I C3I Cyber Advanced Development*					**Project (Number/Name)** CB6 *I C3I Cyber Advanced Development (CA)*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CB6: *C3I Cyber Advanced Development (CA)*	-	30.000	-	-	-	-	-	-	-	-	0.000	30.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Congressional Interest Item funding provided for C3I Cyber Advanced Development.

A. Mission Description and Budget Item Justification
 Congressional Interest Item funding provided for C3I Cyber Advanced Development.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Program Increase - High Bandwidth Cryptomodule Enhancements and Certification	30.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for High Bandwidth Cryptomodule Enhancements and Certification		
Congressional Adds Subtotals	30.000	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603461A *I High Performance Computing Modernization Program*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	222.220	301.964	255.772	-	255.772	259.736	261.100	262.339	265.199	0.000	1,828.330
DS7: *High Performance Computing Modernization Program*	-	182.220	251.964	255.772	-	255.772	259.736	261.100	262.339	265.199	0.000	1,738.330
DW5: *HIGH PERF COMP MODERN (HPCM) (CA)*	-	40.000	50.000	-	-	-	-	-	-	-	0.000	90.000

A. Mission Description and Budget Item Justification

The High Performance Computing Modernization Program (HPCMP) addresses the supercomputing requirements of Department of Defense (DoD) scientists and engineers by: (1) demonstrating and maturing the most advanced, leading-edge computational architectures while exploiting the resulting systems by employing complementary specialized expertise; (2) demonstrating and maturing the Defense Research and Engineering Network (DREN), which investigates, demonstrates, and matures leading-edge digital networking and security technologies to securely deliver computational capabilities to the distributed DoD Research, Development, Test, and Evaluation (RDTE) community; and (3) leveraging specialized expertise from DoD, other federal departments and agencies, industry, and academia to demonstrate and mature leading-edge software application codes. DoD Supercomputing Resource Centers (DSRCs) provide extensive computational capabilities to demonstrate and mature emerging technologies that address the supercomputing requirements of the DoD RDTE community in the areas of hardware, software, and programming environments. All HPCMP sites are interconnected to each other, the DoD High Performance Computing (HPC) RDTE community, and other major defense sites via the DREN, a research network which investigates, demonstrates, and matures (a) state-of-the-art digital networking technologies to ensure a robust distributed environment and (b) the most advanced digital security capabilities to protect the intellectual property of the DoD and its contract entities as they employ HPCMP capabilities. The HPCMP's software application effort (a) optimizes, enhances, demonstrates, and matures critical DoD physics-based and engineering software to allow scientists and engineers to execute calculations with precision and efficiency on leading-edge supercomputers, (b) demonstrates and matures immersive collaborative programming environments to improve science and engineering workflows, and (c) demonstrates and matures leading-edge computational technology from academia and industry. These synergistic activities collectively demonstrate and mature horizontal technologies that are exploited across the DoD RDTE community, ensuring the DoD maintains the most advanced research and development ecosystem in computationally-intensive modeling and design.

The research cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army				Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603461A I *High Performance Computing Modernization Program*		

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	229.123	251.964	254.647	-	254.647
Current President's Budget	222.220	301.964	255.772	-	255.772
Total Adjustments	-6.903	50.000	1.125	-	1.125
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	50.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.903	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	1.125	-	1.125

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: DW5: *HIGH PERF COMP MODERN (HPCM) (CA)*		
Congressional Add: *Program increase*	40.000	50.000
Congressional Add Subtotals for Project: DW5	40.000	50.000
Congressional Add Totals for all Projects	40.000	50.000

Change Summary Explanation
Increased funding due to revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 *I* 3					R-1 Program Element (Number/Name) PE 0603461A *I High Performance Computing Modernization Program*				Project (Number/Name) DS7 *I High Performance Computing Modernization Program*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DS7: *High Performance Computing Modernization Program*	-	182.220	251.964	255.772	-	255.772	259.736	261.100	262.339	265.199	0.000	1,738.330
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The High Performance Computing Modernization Program (HPCMP) addresses the supercomputing requirements of Department of Defense (DoD) scientists and engineers by (1) demonstrating and maturing the most advanced, leading-edge computational architectures and exploiting the resulting systems by employing complementary specialized expertise; (2) demonstrating and maturing the Defense Research and Engineering Network (DREN) which investigates, demonstrates, and matures leading-edge digital networking and security technologies to securely deliver computational capabilities to the distributed DoD Research, Development, Test, and Evaluation (RDTE) and acquisition engineering communities; and (3) leveraging specialized expertise from DoD, other federal departments/agencies, industry, and academia to demonstrate and mature leading-edge software application codes. DoD Supercomputing Resource Centers (DSRCs) provide extensive computational capabilities and demonstrate and mature emerging technologies that address the supercomputing requirements of the DoD RDTE and acquisition engineering communities in the areas of hardware, software, and programming environments. HPCMP sites are interconnected to each other, the DoD High Performance Computing (HPC) RDTE community, and other major defense sites via DREN, a research network which investigates, demonstrates, and matures (a) state-of-the-art digital networking technologies to ensure a robust distributed environment and (b) the most advanced digital security capabilities to effectively protect the intellectual property of the DoD and its contract entities as they employ HPCMP advanced capabilities. The HPCMP's software application effort (a) optimizes, enhances, demonstrates, and matures critical DoD physics-based and engineering software to allow scientists and engineers to execute calculations with precision and efficiency on leading-edge supercomputers, (b) demonstrates and matures immersive collaborative programming environments to improve science and engineering workflows, and (c) demonstrates and matures leading-edge computational technology from academia and industry. These synergistic activities collectively demonstrate and mature horizontal technologies that are exploited throughout the DoD RDTE and acquisition engineering communities, ensuring the DoD maintains the most advanced research ecosystem in the areas of computationally-intensive modeling and design.

The research cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: Department of Defense Supercomputing Resource Centers	92.880	139.101	146.387
Description: The effort investigates, demonstrates, and matures general and special-purpose supercomputing environments that incorporate the most advanced, leading-edge computational architectures, distributed mass storage technologies, and data analysis methodologies; employs complementary specialized expertise to mature and exploit these environments; enables the			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603461A I *High Performance Computing Modernization Program*	Project (Number/Name) DS7 I *High Performance Computing Modernization Program*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
DoD RDTE and acquisition engineering communities to effectively and efficiently investigate, demonstrate, and mature a broad range of technologies through advanced computational methods. *FY 2023 Plans:* Accelerate the integration of commercial cloud computing, with the goal of making it broadly available to the entire HPCMP user community. Continue to integrate data-centric center methodologies into our supercomputing centers to improve the ability to rapidly extract information from complex computations. Continue to accelerate technology capabilities with a suite of supercomputers and high-end computing services to address DoD priorities that satisfy the diverse needs of DoD stakeholders including security, workload, and architecture requirements. Continue to demonstrate the potential benefits of emerging High End Computing technologies including multiple architectures (scientific, analytics, machine learning, etc.) that incorporate leading-edge processors, accelerators, memory, data I/0, interconnect, and OS capabilities. Continue to demonstrate new mechanisms to access and reduce barriers to supercomputers for non-traditional users and establish mechanisms for establishing hybrid cloud connectivity for HEC workflows. Continue to leverage data-intensive supercomputing architectures for DoD use cases in machine learning, artificial intelligence, and data sciences. Implement new capabilities for secure shared highly-classified supercomputing, transportable data-intensive computing at the tactical edge, and persistent data services. Add additional capacity and capability in HPC through strategic retention of HPC assets and conduct pilot projects for burst to commercial cloud computing. *FY 2024 Plans:* Will mature and demonstrate over 20 high-end computers across a full range of classifications at five geographically distributed DoD supercomputing resource centers to collectively provide between 110 and 115 quadrillion floating-point operations per second of capability. Will continue to conduct complex, tightly-coupled, large-scale, scientific and engineering simulations and analyses that mature and demonstrate capabilities for important DoD research, test, and development priorities. Will mature and demonstrate emerging data-intensive computing and persistent data services for DoD use cases. Will continue to mature new technologies for accelerating computations, storing/retrieving large volumes of data (over 200 quadrillion bytes in total), and providing on-demand and secure access to high-end computers. Will mature appropriate, approved solutions for sharing highly classified high-end computers among multiple special programs. Will mature and demonstrate seamless sharing of resources across DSRCs and transparent interfaces with cloud computing services for those DoD entities that demand a hybrid compute capability. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle of this effort.			
Title: Defense Research and Engineering Network *Description:* The DREN effort investigates, demonstrates, and matures state-of-the-art digital networking technologies to ensure a robust distributed environment among HPCMP sites, the DoD HPC RDTE and acquisition engineering communities, and	37.647	52.739	55.501

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603461A I *High Performance Computing Modernization Program*		Project (Number/Name) DS7 I *High Performance Computing Modernization Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
other major defense sites; investigates, demonstrates, and matures the most advanced digital security capabilities to effectively protect the intellectual property of the DoD and its contract entities as they employ HPCMP advanced capabilities; employs complementary specialized expertise to mature and exploit this environment. *FY 2023 Plans:* Continue to refine and exploit DREN (an advanced digital DoD wide area research network and part of the DoDIN backbone) which provides robust, high-bandwidth, low-latency, low-jitter, and full-service network connectivity among the HPCMP and DoD RDTE/Acquisition Engineering (AE) communities with specific efforts targeted at the unique requirements of the T&E and AE communities. Complete transition activities for DREN 4. DREN 4 is the follow-on contract to DREN III, and will provide next-generation technical capabilities and significantly increased bandwidths to support the HPCMP and DoD RDTE/AE communities. Continue to enhance and refine the protection of all external DREN boundaries to enhance the HPCMP's DISA-accredited Tier 2 cybersecurity service provider capability to effectively protect the intellectual property of the DoD and its contract entities as they utilize HPCMP advanced capabilities. Continue to establish and enhance network transport to the commercial cloud for those HPCMP and DoD RDTE/AE communities moving computation, data storage, and other requirements to the cloud environment. Continue to mature the advanced network technologies and complex cybersecurity mechanisms required to implement logically-separated networked COIs at multiple classification levels. Removal of DREN under-provisioning. *FY 2024 Plans:* Will mature and demonstrate secure, advanced networking across a full range of classifications to provide over 1500 Gigabits per second of aggregate bandwidth to more than 215 CONUS and 12 OCONUS sites to implement computational workflows that employ various combinations of high-end computing resources, research assets, test center devices, weapon/platform prototypes, and live participants to mature and demonstrate capabilities for important DoD research, test, and engineering priorities. Will expand DREN installation in the Pacific and other regions of interest to meet test requirements in response to emerging threats. Will continue to mature and enhance the secure protection of DREN from external and internal threats to effectively protect the intellectual property of the DoD and its contract entities engaged in research, test, and engineering missions. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle of this effort.			
Title: Software Applications	51.693	51.202	53.884
Description: This effort optimizes, enhances, demonstrates, and matures software applications to provide for the adaptation of widely used applications and algorithms to address RDTE and acquisition engineering communities requirements. The Computational Research Engineering Acquisition Tools and Environments (CREATE) initiative demonstrates and matures advanced application codes to allow scientists and engineers to use supercomputers to design and analyze virtual prototypes of DoD ships, fixed-wing aircraft, rotorcraft, ground vehicles, and radio frequency (RF) antennas; HPCMP Institutes demonstrate			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603461A *I High Performance Computing Modernization Program*	**Project (Number/Name)** DS7 *I High Performance Computing Modernization Program*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
and mature advanced supercomputing application codes to address critical high-impact DoD challenges (e.g. blast protection for platforms and personnel, high-power microwaves and lasers, munition sensitivities, and mobile network designs/prototypes); High Performance Computing Applications Software Initiative (HASI) projects address the need to mature and refine critical DoD software that can take advantage of new and emerging hardware advances; the Frontier initiative represents and supports the DoD's highest-priority, highest-impact, most demanding computational work, both from a technical and mission-relevance standpoint; the Productivity, Enhancement, Technology Transfer, and Training (PETTT) initiative (1) optimizes and enhances critical DoD physics based and engineering software to allow scientists and engineers to execute scientific calculations with precision and efficiency on leading-edge supercomputers, (2) demonstrates and matures immersive collaborative programming environments to improve science and engineering workflows, and (3) demonstrates and matures leading-edge computational technology from academia and industry. *FY 2023 Plans:* Continue to mature and advance multi-disciplinary software technology in support of current and future defense programs, building a foundation for powerful decision support applications synthesized using advanced machine learning methodologies. Multi-disciplinary technology for aeronautical systems of all types (i.e., fixed and rotary-wing aircraft, munitions, missiles, rockets, etc.), this endeavor will continue to mature model-centric conceptual design software technology to support high-fidelity digital simulations of weapons and weapon support systems across the product lifecycle. This application of physics-based analysis of alternatives, technology trade-space exploration, and analysis of cost implications will improve application. Continue mature software improvements necessary to deploy production quality physics-based design analysis tools for future hypersonic weapon systems (High Speed Strike, Tactical Boost-Glide, and Manned/Unmanned Conventional Prompt Global Strike). For fixed-wing aircraft, a) continue incorporating new generation of high order accuracy solvers; b) continue implementing hypersonic terminal maneuvers; and c) continue incorporating hypersonic long-duration/heat soak algorithms. For rotorcraft, will continue aeromechanics analysis associated with maneuvers, airframe propulsion system integration, and weapons carriage and release, as well as infrared suppression analysis, chaff trajectory prediction, debris ingestion analysis, and loads prediction capability necessary for structural airworthiness assessments. RF antenna design and analysis will continue to mature computational electromagnetics capabilities to assist in design and evaluation of next generation radar for aircraft, ships, and ground-based platforms; continue demonstrating capability for assessment of electromagnetic hazards on ordnance and optimizing computational methods for electronic warfare assessments and evaluation of multiple antenna systems on a single platform a specific area of focus will be the application of antenna evaluation software on naval platforms. Continue to include efforts in aircraft radar signature prediction capabilities that effectively include propulsion system inlet and exhaust critical to design and evaluation of 6th generation fighter/attack aircraft. Continue efforts to incorporate high-resolution (XBand frequencies) virtual test and analysis capabilities for fighter-scale aircraft. For Naval Ships (surface and submarine), continue incorporation of; a) hullform optimization; b) multi-hull seakeeping capabilities; and c) virtual ship powering algorithms. Continue to incorporate 6-D0F submarine maneuvering. Continue development of ship shock virtual test and analysis capabilities incorporating the			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
results of recent CVN-78 shock trials in preparation for establishing alternatives for future ship classes including FFG-62. For Ground Vehicles continue to expand autonomy capabilities associated with ground mobility test requirements. Execute fact finding investigations to understand how physics-informed machine learning more fully can impact DoD priorities and effectively support decision makers throughout weapon system development, deployment, and operation life-cycle. Reintroduction of in-situ HEC subject matter experts to improve S&T efforts directly supporting technology transfer into programs of record and prototype efforts. *FY 2024 Plans:* Will mature and demonstrate 12 software applications for high-end computers to be used by over 150 DoD stakeholder organizations in air, land, and sea programs of record (PORs) as well as future concept development for DoD's highest priorities. Will mature and demonstrate software tools and environments for high-end computers and provide training to over 3000 users to improve resource effectiveness and impact. Will mature software applications for the operation of DSRC high-end computers in support of over 2000 users and operational staff. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	8.922	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	182.220	251.964	255.772

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603461A I *High Performance Computing Modernization Program*						**Project (Number/Name)** DW5 I *HIGH PERF COMP MODERN (HPCM) (CA)*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DW5: *HIGH PERF COMP MODERN (HPCM) (CA)*	-	40.000	50.000	-	-	-	-	-	-	-	0.000	90.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project enables the Defense Research, Development, Test and Evaluation (RDT&E) community to resolve critical scientific and engineering problems more quickly, and with more precision, using advanced, physics-based computer simulation supported by high performance computing (HPC) technology. The computational expertise and resources enable Department of Defense (DoD) personnel to analyze phenomena that are often impossible, not cost effective, too time-consuming, or too dangerous to study any other way. The High Performance Computing Modernization Program (HPCMP) supports the requirements of the DoD's scientists and engineers in three major areas of effort: supercomputing resource centers, the Defense Research and Engineering Network (DREN), and software applications. DoD Supercomputing Resource Centers (DSRCs) provide extensive capabilities and demonstrate new technologies that address user requirements for hardware, software, and programming environments. Efforts of the DSRCs are augmented by dedicated HPC project investments (DHPIs) that address near real-time and real-time HPC requirements. All sites in the HPC Modernization Program are interconnected to one another, the user community, and major defense sites via the DREN, a research network which matures and demonstrates state-of-the-art computer network technologies. The Software Application effort optimizes and improves the performance of critical common DoD applications programs to run efficiently on advanced HPC systems, matures and demonstrates leading-edge computational technology from academic and commercial partners, and provides collaborative programming environments.

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Program increase	40.000	50.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for High Performance Computing Modernization Program		
FY 2023 Plans: Congressional Interest Item funding provided for High Performance Computing Modernization Program		
Congressional Adds Subtotals	40.000	50.000

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603461A *I High Performance Computing Modernization Program*	**Project (Number/Name)** DW5 *I HIGH PERF COMP MODERN (HPCM) (CA)*

D. Acquisition Strategy

  N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603462A I Next Generation Combat Vehicle Advanced Technology						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	294.491	471.434	217.394	-	217.394	195.971	200.168	204.645	216.450	0.000	1,800.553
BF4: Combat Vehicle Robotics Adv Tech	-	25.788	29.321	34.703	-	34.703	36.430	45.160	45.440	45.935	0.000	262.777
BF7: Crew Augmentation and Optimization Adv Tech	-	3.630	4.326	3.812	-	3.812	4.358	4.415	4.418	4.466	0.000	29.425
BG1: Sensors for Auto Oper and Survivability Adv Tech	-	10.275	12.450	12.726	-	12.726	12.735	12.734	12.742	12.880	0.000	86.542
BG3: Modeling and Simulation for MUMT Advanced Tech	-	4.999	5.975	6.276	-	6.276	7.215	7.578	7.418	7.923	0.000	47.384
BG4: Adv Mobility Experimental Prototype Adv Tech Demo	-	2.716	-	-	-	-	-	-	-	-	0.000	2.716
BG7: Ground Systems Active Defense (GSAD) Advanced Tech	-	50.267	60.371	60.617	-	60.617	54.856	58.356	61.319	67.853	0.000	413.639
BG9: Obscuration Advanced Technology	-	2.416	2.765	-	-	-	-	-	-	-	0.000	5.181
BH4: Ground Vehicle Holistic Defense Adv Tech	-	0.033	-	-	-	-	-	-	-	-	0.000	0.033
BH6: Platform Electrification and Mobility Adv Tech	-	29.997	46.679	65.647	-	65.647	43.766	43.743	41.341	45.079	0.000	316.252
BH8: Enhanced VETRONICS Advanced Technology	-	9.227	10.776	10.268	-	10.268	10.618	9.378	12.735	12.873	0.000	75.875
BI3: Sensor Protection Advanced Technology	-	1.585	1.708	1.746	-	1.746	1.748	1.745	1.747	1.766	0.000	12.045
BI5: Materials Application and Integration Adv Tech	-	4.645	5.279	5.502	-	5.502	4.606	4.767	4.769	4.821	0.000	34.389
BJ1: Vehicle System Security Advanced Technology	-	2.365	-	-	-	-	-	-	-	-	0.000	2.365
BK1: Autonomous Mobility Adv Tech	-	5.859	6.221	5.305	-	5.305	5.316	-	-	-	0.000	22.701

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*						
BK4: *Next Gen Intelligent Fire Control(NG-IFC) Adv Tech*	-	1.664	2.198	4.328	-	4.328	-	-	-	0.000	8.190
BK6: *Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech*	-	-	1.534	2.062	-	2.062	9.905	12.292	12.716	12.854	0.000	51.363
BP6: *Ground Vehicle Advanced Technology(CA)*	-	135.250	278.450	-	-	-	-	-	-	-	0.000	413.700
BZ9: *Smart Targeting Environment for Lower Level Assets*	-	3.775	3.381	4.402	-	4.402	4.418	-	-	-	0.000	15.976

A. Mission Description and Budget Item Justification

This Program Element (PE) executes development, maturation, and demonstration for the Army's modernization priority for the Next Generation of Combat Vehicle (NCCV). This PE matures, integrates and demonstrates combat vehicle technologies that enable the Army to have a smarter, faster, more lethal, more precise, more protected, and more adaptable force. Technology development builds upon the foundational vehicle architectures to support the NGCV, to include autonomy architecture, power architecture, vehicle electronic architecture, physical architecture, lethality architecture and vehicle protection architecture. Technologies developed, matured, and demonstrated will enable leap ahead capabilities for manned, optionally manned and unmanned vehicles that deliver decisive lethality.

Research in this PE complements PE 0602141A (Lethality Technology), PE 0602144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology), PE 0602146A (Network C3I Technology), PE 0603116A (Lethality Advanced Technology), PE 0603119A (Ground Advanced Technology), PE 0603463A (Network C3I Advanced Technology), PE 0604115A (Technology Maturation Initiatives), and PE 0708045A (End Item Industrial Preparedness Activities). Research in this PE also transitions to PE 0603645A (Armored Systems Modernization Adv Dev) and PE 0604017A (Robotics Development).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

This PE is directly aligned to the NGCV Army Modernization Priority.

Research is performed by the United States (U.S.) Army Futures Command and the U.S. Army Engineer Research and Development Center.

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B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	299.712	193.242	212.497	-	212.497
Current President's Budget	294.491	471.434	217.394	-	217.394
Total Adjustments	-5.221	278.192	4.897	-	4.897
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	278.450			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-5.221	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	4.897	-	4.897
• FFRDC Transfer	-	-0.258	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: BP6: *Ground Vehicle Advanced Technology(CA)*		
Congressional Add: *Program Increase - Additive Manufacturing for Jointless Hull*	15.000	20.000
Congressional Add: *Carbon Fiber and Graphite Foam Technology*	5.000	-
Congressional Add: *Program Increase - ATE5.2 Engine Development*	5.000	10.000
Congressional Add: *Combat Vehicle Weight Reduction Initiative*	5.000	-
Congressional Add: *Program Increase - Virtual and Physical Prototyping*	8.000	8.000
Congressional Add: *Program Increase - HMMWV Automotive Enhancements*	3.000	9.000
Congressional Add: *Program Increase - Advanced Adhesives*	5.000	5.000
Congressional Add: *Program Increase - Combat Vehicle Lithium 6T Battery Development*	5.000	-
Congressional Add: *Advanced Materials Applications*	12.000	-
Congressional Add: *Augmented Reality for Denied Environments*	7.000	-
Congressional Add: *Program Increase - Autonomous Minefield Clearance*	7.000	8.000
Congressional Add: *Autonomous Vehicle Mobility*	10.000	-
Congressional Add: *Program Increase - Carbon Fiber Tires*	5.000	5.000
Congressional Add: *Force Protection Vehicle Kit*	5.000	-
Congressional Add: *Fuel Cell Technology*	5.000	-

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<u>Congressional Add Details ($ in Millions, and Includes General Reductions)</u>	**FY 2022**	**FY 2023**
Congressional Add: *Program Increase - Machine Learning for Advanced Lightweight Combat Vehicle Structures*	6.000	19.000
Congressional Add: *Program Increase - Maneuverable Lightweight Electric Weight Reducer*	5.000	7.500
Congressional Add: *Program Increase - Off-Road Maneuver*	5.000	5.000
Congressional Add: *Program Increase - Predictive Maintenance System*	2.000	2.000
Congressional Add: *RCV-L*	5.000	-
Congressional Add: *Short Fiber Thermoplastic Applications*	4.000	-
Congressional Add: *Program Increase - Unmanned Navigational Technology*	2.500	3.000
Congressional Add: *Virtual Autonomy Environment*	3.750	-
Congressional Add: *Program Increase - AUGMENTED REALITY FOR DENIED ENVIRONMENTS*	-	7.000
Congressional Add: *Program Increase - AUTONOMOUS SYSTEMS FOR MILITARY GROUND VEHICLES*	-	3.750
Congressional Add: *Program Increase - CYBERSECURITY FOR AUTONOMOUS GROUND VEHICLES*	-	9.000
Congressional Add: *Program Increase - CYBERSECURITY FOR AUTONOMOUS VEHICLES*	-	4.200
Congressional Add: *Program Increase - DIGITAL ENTERPRISE TECHNOLOGY FOR OMFV*	-	15.000
Congressional Add: *Program Increase - DIGITAL TWIN*	-	7.000
Congressional Add: *Program Increase - ELECTRIC DRIVE SYSTEM*	-	5.500
Congressional Add: *Program Increase - ELECTRIFIED VEHICLE INFRARED SIGNATURE MANAGEMENT*	-	5.000
Congressional Add: *Program Increase - ELECTRON BEAM ADDITIVE MANUFACTURING OF CRITICAL METAL RING COMPONENTS*	-	2.000
Congressional Add: *Program Increase - ENHANCED LETHALITY ON ARMY SMALL MULTIPURPOSE EQUIPMENT TRANSPORT*	-	8.000
Congressional Add: *Program Increase - HMMWV OCCUPANCY PROTECTION DEVELOPMENT*	-	10.000
Congressional Add: *Program Increase - HUMAN DIGITAL TWINS AND HUMAN-MACHINE INTERACTION*	-	6.000
Congressional Add: *Program Increase - MODELING AND SIMULATION ACTIVITIES FOR VEHICLE DEVELOPMENT*	-	10.000
Congressional Add: *Program Increase - MODULAR ELECTRIC MOTORS*	-	5.500
Congressional Add: *Program Increase - MULTI-SERVICE ELECTRO-OPTICAL SIGNATURE CODE*	-	9.000
Congressional Add: *Program Increase - NANO-LED FABRICATION FOR AUGMENTED REALITY CONTACT LENS*	-	10.000
Congressional Add: *Program Increase - NEXT GENERATION ELECTRIFIED TRANSMISSION*	-	5.000

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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Program Increase - NEXT GENERATION LIGHT TACTICAL VEHICLE MANEUVER AUTONOMY*	-	5.000
Congressional Add: *Program Increase - SYNTHETIC GRAPHITE BATTERY*	-	10.000
Congressional Add: *Program Increase - VEHICLE TECHNOLOGY READINESS LEVELS*	-	3.000
Congressional Add: *Program Increase - ABRAMS MODERNIZATION*	-	30.000
Congressional Add: *Program Increase - SMALL UNIT GROUND ROBOTIC CAPABILITIES*	-	7.000
Congressional Add Subtotals for Project: BP6	135.250	278.450
Congressional Add Totals for all Projects	135.250	278.450

Change Summary Explanation

Increased funding to support higher priorities within the Science & Technology (S&T) portfolio which include platform electrification and mobility.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
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COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BF4: *Combat Vehicle Robotics Adv Tech*	-	25.788	29.321	34.703	-	34.703	36.430	45.160	45.440	45.935	0.000	262.777
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates innovative enabling technologies that enable scalable integration of multi-domain robotic and autonomous system capabilities teamed within Army formations supporting all combat warfighting functions (close combat, reconnaissance, targeting and acquisition, etc.). Project focus areas include Platform Electronic Control and Autonomy Safety Engineering.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy (AMS).

Research in this Project supports the Next Generation Combat Vehicle (NGCV) Army Modernization Priority.

Research is performed by the United States (U.S.) Army Futures Command (AFC).

Research is also coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology), and transitions to PE 0604017A (Robotics Development).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Platform Electronic Control *Description:* This effort optimizes the electronic, closed loop control of by-wire vehicle systems to provide stable, reliable, and predictable control in the presence of potential malicious or unintended commands for both wheeled and tracked unmanned vehicles. *FY 2023 Plans:* Mature and continue optimization of an expanded closed loop DBW system for robotic ground systems. Optimization of a platform side vehicle control architecture which will be aligned to a known safety standard to mature the current safety pedigree of ground robotic systems this will enable more stable interface controls enabling ease of autonomy integration. Demonstrate these enhancements through EET to show technical maturity. Continue to mature and validate RAS safety standards for unmanned ground vehicle systems based on EET activities. Update Ground Vehicle Robotics Safety Board published guidelines to show they meet best practices for development of safety critical software for unmanned ground vehicle systems while incorporating lessons learned. Validation of Ground Vehicle Robotics Safety Board processes will result in improved safety pedigree which will enable	11.411	8.786	6.229

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603462A I *Next Generation Combat Vehicle Advanced Technology*	Project (Number/Name) BF4 I *Combat Vehicle Robotics Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
higher confidence in receipt safety confirmation to enable testing and reduced developmental time for testing of autonomous ground combat systems. *FY 2024 Plans:* Will mature and continue to optimize an expanded closed-loop drive by wire (DBW) system for robotic ground systems. Will develop and optimize Robotic Vehicle Integration and Safety (RVIS) components for unmanned systems with emphasis on Modular Open System Approach (MOSA) principals. Will develop RVIS components to align with the Autonomous Ground Vehicle Reference Architecture (AGVRA) framework and known safety standards to increase the safety performance of unmanned ground vehicle systems. Will demonstrate enhancements through Engineering Evaluation Testing (EET) to show technical maturity of developed components. Will continue to mature and validate Robotic and Autonomy Systems (RAS) safety standards for unmanned ground vehicle systems based on EET activities. Will continue to update Ground Vehicle Robotics Safety Board published guidelines to show they meet best practices for development of safety critical software for unmanned ground vehicle systems while incorporating lessons learned. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease in FY24 is due to the development of stabilized safety processes which reduce integration risks and provide guidelines for safety certifiable unmanned systems.			
Title: Unmanned Maneuver *Description:* This effort matures and demonstrates the advanced mobility performance of autonomous systems within complex, combat scenarios to allow for the completion of mission goals in individual and teaming configurations at various levels of autonomy. *FY 2023 Plans:* Optimize and demonstrate autonomous vehicle maneuvering in hostile environments using government owned autonomy software, Robotic Technology Kernel (RTK). Mature and demonstrate the ability to conduct Manned-Unmanned Teaming maneuvers including human team members. Improve cybersecurity posture in development of autonomy. Demonstrate advanced collaborative surveillance behaviors for unmanned ground vehicles. Demonstrate all enhancements though EET to ensure the autonomous technology has been fully evaluated for system safety, thereby demonstrating technical maturity. Mature the Autonomous Ground Vehicle Reference Architecture (AGVRA) framework by developing conceptual, logical and physical data models while connecting them to exiting instantiated architectures and further develop safety and cyber models and associated libraries to support these evolving model viewpoints. Develop and mature the Robot Operating System - Military (ROS-M) to support the registration and distribution of Robotic and Autonomous System models. *FY 2024 Plans:*	9.099	14.135	20.346

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BF4 *I Combat Vehicle Robotics Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will improve and demonstrate autonomous maneuver in degraded or hostile environments, enabling autonomous maneuvers in areas where sensor performance is poor (e.g. due to weather or smoke) and communications are not reliable. Will demonstrate coordinated movements using robotic or human team members. Will improve night-time operation of autonomous vehicles by reducing vehicle signatures through the implementation of passive sensing techniques. Will continue to mature the AGVRA framework by updating based on previous versions of conceptual, logical and physical data models while connecting them to exiting instantiated architectures. Will mature the safety and cyber meta-models and libraries associated with the AGVRA in order to support these evolving viewpoints. Will mature AGVRA functional model stereotypes by building functional models to demonstrate a cohesive functional model baseline. Will develop and mature the Robot Operating System - Military (ROS-M) to support the ability to register and distribute concepts including hardware, specifications, requirements, standards, and architectures associated to Robotic and Autonomous System (RAS) models within the Robotic Technology Kernel (RTK). ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increased in FY 2024 due to transition of capabilities from PE 0602145A / Next Generation Combat Vehicle Advanced Technology Project BF3: Combat Vehicle Robotics Tech - Autonomous Behaviors & Perception. Funding also increased for the Autonomous Forward Surveillance effort which will bring additional capability for clandestine surveillance and night-time operation			
Title: Soldier-Robotic Interface Integration ***Description:*** This effort is a focused approach to optimize control of the unmanned systems with improved performance incorporating Manned-Unmanned Teaming enabled formations and is measured against multiple phases of the combat scenario for improved operational effectiveness and overall system performance. ***FY 2023 Plans:*** Mature and demonstrate an enhanced human robot interaction technology to improve the effectiveness of the robot as a tool for the human to complete the mission utilizing built in government owned Warfighter Machine Interface (WMI) software. Exploit Manned /Unmanned Teaming technologies that will allow the operator to be at a longer standoff distance while enabling efficient control of robotic platforms. Optimize novel control methods leveraging a wide range of hardware interfaces to improve robotic control across multiple control methods (mounted interface / dismounted-tablets/heads-up displays). Demonstrate these technology enhancements through EET to validate the autonomous technology system safety and technical maturity. ***FY 2024 Plans:*** Will develop an enhanced network situational awareness capability through the integration of communication and network technology into the Warfighter Machine Interface (WMI). this will create an enriched user interface development, which will allow (in a much more effective manner) the robot operator to have a greater understanding of the boto's situational awareness and its ability to maneuver. This will create a greater ability to complete the mission and successfully achieve objectives. Will focus on	5.278	4.104	5.657

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
integration of the WMI into RVIS model. These will be visible at the EET as the SRI technologies will be linked across many of the testing events.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding increase in FY24 covers the transition of Combat Vehicle Robotics Technology Human Robotic Interaction technologies. .			
Title: : Small UGV as Deployable Sensor	-	2.296	2.471
Description: This effort improves the long range autonomy, mobility and sensing capabilities of small UGVs to expand reconnaissance in terrains and environments large systems cannot reach (i.e. culverts, underground, dense urban) and to serve as unmanned listening & observation posts. The small UGVs will deploy out of NGCV systems to enhance battlespace awareness and reduce the risk to the systems.			
FY 2023 Plans: Develop and optimize small robot autonomy built within the government owned RTK autonomy software to overcome size, weight and power (SWaP) limitations of small platforms. Develop and implement enhanced functionality and task-distribution (swarming) to overcome mobility and functional limitations of small robots for effective reconnaissance. Mature and demonstrate MMPs interoperable across multiple platforms that provide commanders with options to configure systems to the mission needs. Demonstrate these enhancements through Engineering EET to ensure the autonomous technology and integrated MMPs have been fully evaluated for system safety, performance and technical maturity.			
FY 2024 Plans: Will integrate, optimize, and demonstrate advanced autonomy behaviors, including: Intelligence, Surveillance and Reconnaissance (ISR) sensors, and optimize small unmanned ground system platform and controls. Will implement and demonstrate greater autonomy behaviors for small UGVs by improving their unmanned systems teaming abilities through the enhancement of their RTK capabilities, allowing them to autonomously deploy from an unmanned combat vehicle, maneuver in rough terrain, and perform reconnaissance tasks & surveillance. Will integrate and demonstrate Artificial Intelligence (AI) enabled optical and audio Modular Mission Payload (MMP) sensors with small UGV autonomy, allowing them to optimize threat and target detection probability when performing reconnaissance and surveillance missions. Will develop and mature an optimized system control architecture to overcome the SWaP limitations of small platforms when enabled with the sensors required to perform complex tasks and extended mission times. Will demonstrate these enhancements through EET ensuring the autonomous technology and integrated MMPs have been fully evaluated for system safety, performance and technical maturity.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increased in FY24 to advance autonomy behaviors technologies, integrate advanced ISR sensors and optimize system performance.			
Accomplishments/Planned Programs Subtotals	25.788	29.321	34.703

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Appropriation/Budget Activity 2040 *I* 3	R-1 Program Element (Number/Name) PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	Project (Number/Name) BF7 *I Crew Augmentation and Optimization Adv Tech*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BF7: *Crew Augmentation and Optimization Adv Tech*	-	3.630	4.326	3.812	-	3.812	4.358	4.415	4.418	4.466	0.000	29.425
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced technologies to enable crew augmentation and optimization for closed hatch operations of ground vehicle platforms in a complex multi-domain operations environment. This includes integration of intelligent technologies to improve dynamic tasking and full crew interactions, machine learning to improve decision aids, early warnings, reduce response times and shorten task durations, and machine learning to optimize tasking and function. Mature technologies are incorporated onto existing or prototype Army-owned technology demonstrators so that performance of the enabling technologies can be evaluated.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is conducted by the United States (US) Army Futures Command.

Work in this Project is also coordinated with work in Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) and PE 0602143 (Soldier Lethality Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Crew Augmentation and Optimization Advanced Technology	3.630	4.326	3.812
Description: This effort focuses on optimizing crew station technologies while reducing crew sizes that will provide the same overall performance by exploiting human-machine interaction technologies, automation, machine intelligence and customization to permit soldiers to achieve performance beyond today's constrained ground vehicle environment *FY 2023 Plans:* Integrate and demonstrate a threshold capability to adapt autonomous technologies by providing information regarding battlefield context inferred from Soldier behaviors. Integrate and demonstrate technology aids with basic integrated decision support tools for automated play calling and task allocation. Integrate and demonstrate after-action review (AAR) technology that enables Soldier-driven adaption of autonomy behavior from mission to mission. Validate effectiveness in an operationally-relevant and motion-based Modeling & Simulation (M&S) virtual validation. *FY 2024 Plans:*			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will integrate, optimize, and demonstrate an initial capability for embedded training tools that facilitate soldier comprehension and utilization of autonomous systems; integrate, mature, and demonstrate technologies that automate re-allocation of tasks of vehicle crew members to reduce overall soldier cognitive load; mature and demonstrate technology aids to process and share information between crew and autonomous agents to improve vehicle and overall platoon-level situational awareness; validate platoon-level maneuver effectiveness in an operationally-relevant field demonstration. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort to execute platoon-level field demonstration.			
Accomplishments/Planned Programs Subtotals	3.630	4.326	3.812

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BG1: *Sensors for Auto Oper and Survivability Adv Tech*	-	10.275	12.450	12.726	-	12.726	12.735	12.734	12.742	12.880	0.000	86.542
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, optimizes, and demonstrates automated, advanced multi-function sensors and integrates threat cueing capabilities for operations in full spectrum, complex environments, for next generation manned, optionally manned, and robotic platform applications. This Project will deliver sensor payloads which provide greatly increased situational awareness (e.g. pre-shot and hostile fire detection, threat classification) in all environments for manned and unmanned ground vehicle systems.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Army Science and Technology Next Generation Combat Vehicle, Soldier Lethality, and Future Vertical Lift modernization priorities.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Sensors with Embedded Processing	5.539	8.695	8.989
Description: Matures and demonstrates advanced, multi-spectral and multi-function sensors, and image processing capabilities with improved performance in all environments and against all threats to include low-contrast targets in camouflage or in degraded conditions. Matures and demonstrates rapid detection of concealed enemy optical threat systems (visible, midwave infrared, longwave infrared) and real-time hostile fire detection (HFD) for anti-armor threats while on the move, exploiting multi-functional imaging components and embedded processing. Enables enhanced situational awareness and targeting capabilities in complex environments via manned, optionally manned, and robotic platform applications. *FY 2023 Plans:* Optimize novel uncooled infrared sensors, incorporating low power processing to minimize system size, weight, and power. Optimize targeting and threat detection sensors with embedded multifunction processing against threats at increased range in complex environments. Mature and provide advanced targeting and navigation laser technologies, novel image processing approaches and infrared sensors for on-the-move target detection, ranging and tracking. Validate image processing approaches to enable optimized transmission from sensor to shooter systems. *FY 2024 Plans:*			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will integrate advanced high speed, high sensitivity sensor components with novel uncooled infrared sensors to enable a modular uncooled infrared sensor system with low power processing and reduced size, weight, and power (SWAP); integrate optimized, far target location capability into advanced targeting system for increased performance while on-the-move; demonstrate targeting and threat detection sensors with embedded processing for detection of threats at increased range in complex environments; improve sensor-to-shooter timelines through automation of low level sensor tasking. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding represents planned lifecycle of effort			
Title: Multi-Mission Payload ***Description:*** Matures and demonstrates sensor payloads for ground vehicle based unmanned aerial systems to detect line of sight, and beyond line of sight threats and complex obstacles such as personnel and vehicles in all environments. ***FY 2023 Plans:*** Demonstrate rotary wing unmanned aerial system optionally tethered with a manned or unmanned ground vehicle (UGV) for detection of threats in complex environments, day or night. Demonstrate real time feature extraction and target detection capabilities to increase detection of near-pear threats and suppress clutter. Exploit fusion of polarization sensors and advanced lasers to enhance detection of a wider range of threats and improve target location accuracy. ***FY 2024 Plans:*** Will demonstrate polarization sensors co-located with existing electro-optic/infrared (EO/IR) sensors and advanced lasers on a rotary wing small unmanned aerial system (sUAS) to enhance detection of a wider range of threats and to improve target location capabilities in complex terrain and temperate environments; demonstrate real-time feature extraction and target detection capabilities on-board the sUAS to detect near peer threats while suppressing clutter to reduce false alarms ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding represents planned lifecycle of effort	4.736	3.634	3.737
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:***	-	0.121	-

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Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BG1 / *Sensors for Auto Oper and Survivability Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	10.275	12.450	12.726

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*				**Project (Number/Name)** BG3 *I Modeling and Simulation for MUMT Advanced Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BG3: *Modeling and Simulation for MUMT Advanced Tech*	-	4.999	5.975	6.276	-	6.276	7.215	7.578	7.418	7.923	0.000	47.384
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates modeling and simulation (M&S) tools/technologies to assess and improve freedom of movement for ground forces and supports vehicle developers by addressing challenges for robotic and ground vehicles. This Project matures and demonstrates obstacle detection capabilities for autonomous systems operating in complex environments. This Project also matures and demonstrates real-time mobility decision support tools, vehicle-terrain interaction models for autonomous convoy operations, simulation tools for vehicle mobility in highly altered terrain, and M&S tools for predicting the performance of autonomous vehicles. These M&S technologies can be integrated across Army vehicle platforms as required.

Work in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) / Project BG2 (Modeling and Simulation for MUMT Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Simulation Tools for Combat Vehicle Robotics (CoVeR) Demonstrations	4.999	5.816	-
Description: This effort matures and demonstrates M&S tools to support the development of autonomous ground vehicle platforms and components for successful maneuver in unstructured and mission relevant environments. This effort demonstrates M&S capabilities to evaluate hardware and software technologies enabling battlefield autonomy in complex and challenging environments.			
FY 2023 Plans: Mature and demonstrate advanced algorithms to detect obstacles to maneuver in unstructured and operationally relevant environments. Mature and demonstrate computational environment test bed to support development of autonomous vehicle platforms and components; release of M&S tools with high-fidelity software-in-the-loop capability.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding decrease reflects planned lifecycle conclusion of this effort and transition of technologies.			
Title: SBIR/STTR Transfer	-	0.159	-

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: Autonomous Vehicle/Terrain Interactions Demonstration *Description:* This effort matures and demonstrates the Virtual Autonomous Navigation Environment (VANE) to robustly simulate multiple vehicles/teaming behaviors operating in complex formations and complex, unstructured environments. This effort provides the capabilities to computationally assess manned/unmanned vehicle maneuvering through cross-country environments ensuring battlefield overmatch. *FY 2024 Plans:* Will integrate robust, high-fidelity, physics-based sensor models into the Virtual Autonomous Navigation Environment (VANE) M&S tool. Will demonstrate high-fidelity M&S tools integrated with Software-in-the-Loop capabilities to simulate and predict simple, coordinated manned-unmanned teaming movements. Will demonstrate the rapid generation of relevant geospacial world scenes. *FY 2023 to FY 2024 Increase/Decrease Statement:* This is a new effort in FY2024 to mature and demonstrate the vehicle terrain interface and enhancements to the VANE for formations.	-	-	6.276
Accomplishments/Planned Programs Subtotals	4.999	5.975	6.276

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks
 N/A

D. Acquisition Strategy
 N/A

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COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BG4: *Adv Mobility Experimental Prototype Adv Tech Demo*	-	2.716	-	-	-	-	-	-	-	-	0.000	2.716
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced powertrain, power generation and running gear technologies into a combat vehicle that will reduce the percentage of no- go terrain for ground vehicles, increase the maneuver speeds across all traversable terrain, reduce fuel demands thus extending operation time between resupply, and provide onboard power generation to enable the integration of energy-based capabilities such as directed energy weapons and electromagnetic armor.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is conducted by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0604115A (Technology Maturation Initiatives).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Mobility Experimental Prototype (AMEP) Advanced Technology	2.716	-	-
Description: This effort develops and demonstrates the advanced powertrain, track and running gear, and unmanned robotic technologies for integration into a ground combat vehicle that will provide increased mobility, maneuver speeds, and optionally manned capabilities in order to validate performance and capability enhancements at increased vehicle weights to inform ground combat vehicle design.			
Accomplishments/Planned Programs Subtotals	2.716	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks

D. Acquisition Strategy
N/A

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COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BG7: *Ground Systems Active Defense (GSAD) Advanced Tech*	-	50.267	60.371	60.617	-	60.617	54.856	58.356	61.319	67.853	0.000	413.639
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates protection and survivability technologies to increase the survivability of ground vehicles and the protection of the Soldiers who depend on them. The tasks will focus on component maturation and demonstration and transfer products for demonstration as holistic (vehicle level) solutions. The Project will mature and demonstrate technologies to defeat threats throughout the timeline of a threat engagement; from obscuring a target, to actively defeat a threat and through mitigating its effects after engagement. These technologies include the active employment of smoke, physical and electronic active protection, advanced and adaptive armors, advanced and active blast mitigation systems and adaptive interior protection.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project will be coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Radar and Soft-Kill (A-RASK) Suite	0.938	6.567	6.836
Description: This effort matures and demonstrates next generation vehicle radar technologies and holistic electronic warning and soft-kill countermeasure techniques to support a layered modular active protection suite and ensure the survivability of ground combat platforms in all-weather day or night conditions with 360 degree situational awareness and threat Anti-Tank Guided Missile (ATGM) defeat. *FY 2023 Plans:* Begin development of universal threat detection sensor hardware and algorithms to detect priority ATGM threats. Evaluate sensor system level requirements based upon the latest live fire demonstration results from Fiscal Year 2022 (FY22). Conduct sensor sub-system derived requirements analysis with modeling and simulation. *FY 2024 Plans:*			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will continue development of universal threat detection sensor hardware and algorithms to detect priority ATGM threats; complete models of the system and subsystem components and analyze performance of the technology against emerging threat performance parameters; evaluate models to identify methods for optimizing the system and subsystem components; develop additional soft-kill countermeasure techniques for emerging classes of ATGM threats. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Soft-Kill System Development ***Description:*** This effort focuses on maturing and demonstrating soft-kill system technologies to protect combat vehicles from current and emerging ATGM threats at stand-off distances with an unlimited magazine and low collateral hazard. This capability will also enhance situational awareness to vehicle occupants by detecting and alerting when threats have been fired. Technologies will be optimized and integrated on combat vehicles using the MAPS Framework and Controller. They will be demonstrated in a relevant environment. ***FY 2023 Plans:*** Develop components and other hardware needed for FY23 demonstration and vehicle integration in FY24. Integrate the soft-kill subsystems matured in FY22 utilizing the MAPS Framework and Controller. Optimize ground vehicle system performance and continue lab and field demonstrations to assess system performance of integrated subsystems. ***FY 2024 Plans:*** Will integrate the soft-kill system onto a ground combat vehicle; validate the soft-kill system performance through hardware-in-the-loop (HWIL) lab evaluation and physical live-fire demonstration, including demonstrating 360 degree field of regard and on-the-move capabilities; demonstrate the ability to defeat multiple ATGM classes. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The funding increase reflects additional effort in subsystem maturation as system integration work is accelerated.	9.827	15.046	16.867
Title: Survivability Capability Characterization and Demonstration ***Description:*** This effort evaluates and demonstrates emerging protection technologies to characterize and assess their performance and maturity and potential for transition to Product Manager (PdM) Vehicle Protection System (VPS). ***FY 2023 Plans:***	2.412	2.354	2.389

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Demonstrate and validate the selected survivability subsystem. Transition relevant information to our acquisition stakeholders and help determine the feasibility of further maturing the subsystem. Analyze available survivability subsystems capability and applicability to current ground vehicle platforms, targeting threats. ***FY 2024 Plans:*** Will evaluate selected survivability subsystem for performance and platform integration feasibility; coordinate desired technical knowledge and provide to transition partner, informing our acquisition stakeholders so they can determine the viability of technology insertion on selected platform(s); continue to identify available survivability subsystems for uniqueness and applicability to current ground vehicle platforms requirements. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Sensors for Adaptive Armor ***Description:*** This effort matures and demonstrates sensor technology to enable an adaptive armor system using the MAPS Framework and Controller on a combat vehicle platform. This effort matures real-time processing software, continuously refines the threat trajectory prediction algorithm and integrates sensors with an adaptive countermeasure for threat defeat to the MAPS Framework and Controller to ensure the activation of adaptive armor to protect against incoming threats. ***FY 2023 Plans:*** Improve trajectory prediction algorithm of the sensor technology to enable adaptive armor system. Mature sensor subsystem integration and demonstrate capabilities against pacing applicable threats in a relevant environment. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** In FY 2024, funding realigned to APS Residuals Protection Maturation and Complex Threat Attack Protection (CTAP) within this Project.	1.629	1.476	-
Title: APS Residuals Protection Maturation and Complex Threat Attack Protection (CTAP) ***Description:*** This effort contributes to the Army's ground vehicle survivability by maturing, integrating, and demonstrating advanced technologies which physically defeat incoming threats. These technologies involve passive and reactive mechanisms that work seamlessly with active protection systems in order to increase the overall efficiency of the system. This effort will mature and demonstrate armor components that defeat residual blast and fragmentation from hard-kill active protection systems engagements with kinetic threats in order to protect vehicle occupants and critical subsystems. This effort also matures and demonstrates armor and occupant protection components that provide threat defeat for advanced and emerging threats with complex defeat mechanisms.	9.714	7.313	9.471

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BG7 *I Ground Systems Active Defense (GSAD) Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Build upon prior year work to integrate and demonstrate packaged component for protection against threat residuals at the system-level. Mature and optimize components through integrated system-level environmental and automotive durability testing, followed by ballistic testing, to validate performance against system-level requirements. Validate compliance with vehicle system architecture. Provide capstone demonstrations of capabilities to protect from pacing threats in a relevant environment.			
FY 2024 Plans: Will mature and demonstrate component technologies developed under PE 0602145A, Project BG 6, Advanced Concepts for Active Defense for vehicle and occupant protection against advanced and emerging threats with complex defeat mechanisms; mature and package these component designs for vehicle integration including durability; demonstrate hardened component's threat defeat performance through exposure to environmental conditions (e.g. MIL-STD-810); validate that the packaged component's physical parameters such as size and weight are able to meet vehicle system-level design constraints.			
FY 2023 to FY 2024 Increase/Decrease Statement: This funding increase is due to a shift in focus towards threats with complex defeat mechanisms and maturing technologies that defeat them.			
Title: Controls and Architecture	5.253	5.520	5.560
Description: This effort provides the basis for holistic (vehicle level) active defense by ensuring compatibility of active defense subsystems and systems. This effort matures and demonstrates the effectiveness and efficiency of the controls and architecture for active defense systems. The focus will be to enable the integration of multiple emerging survivability technologies into safe and secure configurations. This effort will optimize size, weight, and power - cooling (SWaP-C) performance for the system components. *FY 2023 Plans:* Optimize active survivability architecture for single platform protection. Conduct build of base kit hardware and software products, to include enhancements, and will perform component level validation and verification. Verify available components for coordinated efforts. Validate software performance against new enhancements through regression testing to ensure backward compatibility. Perform studies for collaborative active defense across multiple platforms. *FY 2024 Plans:* Will perform system-level demonstration of the initial base kit hardware and software products in a lab environment; continue to optimize software against established layered survivability technologies and ensure minimal impact to fielded technology; report and define requirements for collaborative active defense. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BG7 *I Ground Systems Active Defense (GSAD) Advanced Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned lifecycle of this effort.			
Title: Hard Kill Active Protection System (HK APS) Development, Integration, and Demonstration	20.494	21.055	19.494
Description: This effort matures, integrates, and demonstrates a HK APS capable of defeating RPGs, Anti-Tank Guided Missiles, and Recoilless Rifles ensuring the platform's ability to shoot, move and communicate after an engagement. The system will be compliant to the Modular APS Framework (MAF). This effort will optimize an HK APS that includes the following sub-systems; counter-measure, launcher, and sensors (active/passive). Will demonstrate HK APS capabilities in a virtual and live fire demonstration in a relevant operational environment. Counter-measure (CM): Matures and demonstrates CM designs that includes the following aspects: blast size, time of flight, velocity, engagement distance, accuracy, and SWaP-C. Analysis will be conducted for each counter-measure component as well as at the sub-system level. Demonstrations will be performed in the following environments: virtual, hardware in the loop, and live fire. Launcher: Matures and demonstrates launcher designs that considers the following aspects: SWaP-C, engagement speed and accuracy, number of launchers, material composition and reliability. The most mature and suitable launcher for the project will be demonstrated in the following environments: virtual, hardware in the loop, and live fire. Sensors: Matures and demonstrates overall sensor suite design (active/passive) that considers the following aspects; radar frequency, power, weight, volume, algorithms, accuracy, search range, tracking and identification time, and passive cueing integration and optimization. The most mature and suitable sensor suite (active/passive) for the project will be demonstrated in the following environments: virtual, hardware in the loop, and live fire. Integration: Demonstrate the matured HK APS sub-systems on a platform in the following environments: virtual, hardware in the loop, and live fire. This will also analyze subsystem and system performance characteristics against Integrated Product Team (IPT) stakeholder requirements. Develop a performance baseline for future hard kill system evaluations. *FY 2023 Plans:* Improve and optimize the sub-system requirements and design through analysis. Conduct a down-selection of the countermeasure (CM) warhead, guidance, and other sub-system components. Mature design of the sensor sub-system, with industry partners, to tailor the performance to meet the requirements of the CM sub-system. Optimize the system architecture within the established APS framework to ensure components are designed for system compliance and compatibility. Begin			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BG7 *I Ground Systems Active Defense (GSAD) Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
planning virtual tests and demonstrations of the sub-systems. Continue planning integration of the sub-systems to develop the system-level design. *FY 2024 Plans:* Will execute a system-level Preliminary Design Review including the Countermeasure (CM), Launcher and Sensor sub-systems - all of which draw from the baselines established in the sub-system Preliminary Design Reviews; progress to conducting individual Critical Design Reviews for the CM, Launcher, and Sensor sub-systems with industry and government experts; improve and optimize an HK APS simulation to represent the system in a relevant environment and conduct overall system performance analysis; conduct demonstrations of CM and Sensor sub-system capabilities in a System Integration Laboratory setting; improve integration plan for the sub-systems into a unified HK APS onto the demonstration platform. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	1.040	-
Accomplishments/Planned Programs Subtotals	50.267	60.371	60.617

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*				**Project (Number/Name)** BG9 *I Obscuration Advanced Technology*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BG9: *Obscuration Advanced Technology*	-	2.416	2.765	-	-	-	-	-	-	-	0.000	5.181
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY24, funding administratively realigned to Program Element 0603119A Project DG2 Advanced Development of Obscurants to correctly align effort to proper Army modernization priority.

A. Mission Description and Budget Item Justification

The Project matures and demonstrates obscurant technologies with potential to enhance personnel and platform survivability by degrading threat force surveillance sensors and defeating the enemy's target acquisition devices, missile guidance, and directed energy weapons. Dissemination systems for new and improved obscurants are developed with the goal of providing efficient and safe screening of deployed forces. Synthetic Biology Manufacturing technologies in this project will provide Department of Defense (DoD) with the ability to manufacture products such as explosive alternatives and defense-only critical chemicals & materials.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research is performed by the United States (U.S.) Army Futures Command.

Research in this Project is related to and fully coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Obscuration	2.416	2.664	-
Description: This effort matures and demonstrates the dissemination of new and advanced obscurants.			
FY 2023 Plans: Conduct field demonstration of a bi-spectral screening obscuration module and transition to Program Manager. Down-select material coating and conduct flammability testing.			
FY 2023 to FY 2024 Increase/Decrease Statement: This project is administratively realigned to Program Element 0603119A, Project DG2, Advanced Development of Obscurants.			
Title: SBIR/STTR Transfer	-	0.101	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BG9 / *Obscuration Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	2.416	2.765	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603462A I *Next Generation Combat Vehicle Advanced Technology*					**Project (Number/Name)** BH4 I *Ground Vehicle Holistic Defense Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BH4: *Ground Vehicle Holistic Defense Adv Tech*	-	0.033	-	-	-	-	-	-	-	-	0.000	0.033
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will be the basis for a holistic survivability design framework utilizing virtual design models in a Modeling and Simulation (M&S) environment as well as conducting hardware in the loop and live fire demonstration. This Project will inform multiple system level demonstrations to validate that layered survivability technologies are optimized to defeat emerging near-peer threats. Data collected will be used to further validate and verify M&S tools. This Project also provides a design approach available to analyze and adjust the family of protection technologies for combat vehicles in relevant operational theaters.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0603462A (Next Generation Combat Vehicle Advanced Technology) / Project BG7 (Ground Systems Active Defense (GSAD) Advanced Tech) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Layered Survivability Demonstration	0.033	-	-
Description: This effort will utilize virtual models in a M&S environment to analyze layered survivability technologies for integration to a demonstration platform. Selected technologies will be demonstrated in a relevant environment to include, virtual, hardware/software in the loop, and live fire environments. This effort will validate that layered Survivability technologies are optimized to defeat threats consistent with the threat defeat capabilities of the selected technologies.			
Accomplishments/Planned Programs Subtotals	0.033	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BH4 *I Ground Vehicle Holistic Defense Adv Tech*

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army								Date: March 2023			
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*				**Project (Number/Name)** BH6 *I Platform Electrification and Mobility Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BH6: *Platform Electrification and Mobility Adv Tech*	-	29.997	46.679	65.647	-	65.647	43.766	43.743	41.341	45.079	0.000	316.252
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, integrates and demonstrates technologies to electrify both manned and unmanned Next Generation Combat Vehicle platforms. Electrification of these platforms will enable advanced onboard electrified payloads such as directed energy weapons, reduce battlefield fuel consumption, and provide new capabilities such as burst acceleration, extended silent mobility and silent watch. This Project will also mature, integrate and demonstrate technologies to increase electric power such as a high voltage/temperature generator and high power/ temperature power electronics as well as technologies to reduce power demands including composite rubber band track and adaptive hydro-strut suspension.

This Project matures, integrates and demonstrates energy storage and charging technologies and addresses associated domestic supply chain challenges. ?This Project also continues work between the Department of Energy and the Department of the Army with a focus on energy storage for electrification, providing an emphasis on developing advanced technologies that enable military ground vehicles to become significantly more energy efficient. ?The combined efforts in this project will have a positive impact toward reducing Army impact on climate change.

Work in this Project complements Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Work is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Platform Electrification Technologies **Description:** This effort matures and integrates components and sub-systems in order to demonstrate a modular electrification architecture that scales across light to heavy weight classes of combat vehicles. **FY 2023 Plans:** Validate subsystems for the electric sprocket drive, diesel-electric power system and thermal management system, and demonstrate all sub-systems in a system integration validation laboratory. Validate supervisory controls for the subsystem	11.615	11.652	13.636

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603462A I *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BH6 I *Platform Electrification and Mobility Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
controls and integrated system operation. Perform subsystem integration and laboratory evaluation of a modular high voltage energy storage system. Mature and improve performance of tactical battlefield recharging technologies. Continue to improve electric sprocket drive and electric cooling to support Heavy Combat Vehicle electrification requirements. *FY 2024 Plans:* Will integrate components for electric drive cooling system, including fluid pumps, heat exchangers, fans, and interconnecting components. Will optimize platform electrification system performance in the system integration laboratory. Will validate performance under full range of military conditions. Will improve electrification architecture robustness during faults and degraded modes possible from battlefield damage. Will improve recharge rate of a modular high voltage energy storage system. Will integrate technology from non-traditional vendors to improve performance of composite track system technology with longer lasting compounds at higher weight carrying capacities to increase mobility *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increased to support application of electric sprocket drive and electric cooling for heavy combat vehicle electrification			
Title: Advanced Mobility Technologies *Description:* This effort matures and demonstrates a reduced weight composite running gear system for medium combat vehicle applications which increases operational effectiveness and reduces fuel consumption. *FY 2023 Plans:* Improve performance of composite track system technology with longer lasting compounds at higher weight carrying capacities. Optimize external suspension system design to increase mobility performance. *FY 2024 Plans:* Will validate segmented composite running gear and track systems to prove out component performance and supportability improvements. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle of this effort as it completes development.	6.608	5.949	1.699
Title: Advanced Vehicle Power Technology Alliance - Electrification Technology *Description:* This effort matures and develops advanced energy storage technologies to improve power and energy performance and safety for vehicles. Higher energy stored with less space and weight increases vehicle efficiency and range. Ensures electrified ground vehicles have enough power for mobility, silent watch, and enables capabilities such as advanced protection, lethality and network capabilities. This effort is a partnership with the Department of Energy. *FY 2023 Plans:*	2.994	2.166	2.406

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603462A I Next Generation Combat Vehicle Advanced Technology	Project (Number/Name) BH6 I Platform Electrification and Mobility Adv Tech

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Improve energy storage module performance and validates performance at the energy pack level. *FY 2024 Plans:* Will demonstrate commercial based advanced energy storage system on a combat vehicle to enable all-electric capability. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: System/Vehicle Integration and Test *Description:* This effort integrates advanced mobility, platform electrification components and electrification architecture technologies into surrogate platforms and demonstrates the performance, scalability and modularity of the system approach which will provide the capabilities of silent mobility, improved mobility performance, improved operational duration without re-supply, and provides power to enable integration of advanced protection, lethality and network capabilities. *FY 2023 Plans:* Demonstrate the electrified system control, performance, and operational energy efficiency through system-level integration and laboratory testing. Integrate the modular/ scalable electrified system into surrogate platforms for future demonstration. *FY 2024 Plans:* Will complete system-level integration and laboratory testing over the full range of military operating conditions; mature control system software to enable in-vehicle testing. Will integrate components into surrogate vehicle demonstrator. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort to include modification of a surrogate vehicle and integration of required systems to allow in-vehicle evaluation.	3.504	3.910	8.950
Title: Scalable Electrification & Control Architecture Technology *Description:* This effort validates component-level performance and integrates the power distribution and control components to implement a common, scalable, electrified vehicle power architecture to enable analyze layered survivability technologies, high voltage batteries, fast vehicle charging from the grid, and silent mobility on combat platforms from 15 to 50 tons. *FY 2023 Plans:* Demonstrate component-level performance of high voltage power distribution component that enables electrified powertrains, and integrate that component into the power subsystem to validate subsystem-level performance. Provide power subsystem software that will take advantage of the new capabilities and use-cases they enable. *FY 2024 Plans:*	2.864	3.471	4.224

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			**Date:** March 2023		
Appropriation/Budget Activity 2040 I 3		**R-1 Program Element (Number/Name)** PE 0603462A I *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BH6 I *Platform Electrification and Mobility Adv Tech*		

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will improve subsystem performance incorporating the new hardware (high voltage power distribution and high voltage power converter); optimize subsystem software to fully take advantage of the new capabilities and use-cases they enable. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Title: Robotic Combat Vehicle Silent Watch and Mobility Range Extension Advanced Technology ***Description:*** This effort matures and demonstrates JP8 reformer components and sub-systems that provide extended silent watch and mobility as part of a modular electrification architecture supporting robotic combat vehicles. The Army's robotic combat vehicles are expected to have increased silent watch and silent mobility requirements that are not met by current technologies. ***FY 2023 Plans:*** Demonstrate initial JP8 reformer and anode supported solid oxide fuel cell system for a light robotic combat vehicle for increased silent watch and mobility. ***FY 2024 Plans:*** Will demonstrate JP8 reformer and metal supported solid oxide fuel cell system in a medium robotic combat vehicle for increased silent watch and mobility; conduct system level design of power dense range extender. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort to optimize power density of range extender to allow greater operational duration.	2.412	1.984	3.545
Title: Parallel Hybrid Electric Combat System ***Description:*** This effort is focused on developing and demonstrating a parallel hybrid electric capability for tracked combat veicles that will enable silent mobility and improved fuel efficiency. ***FY 2023 Plans:*** Develop architecture and controls to enable a clutch with position sensor necessary for a parallel hybrid tracked combat systems. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding for this effort continues in 'Combat Vehicle Hybrid Electric Capability Demonstration' effort within this project.	-	1.767	-
Title: Tactical and Wheeled Vehicles Hybrid Electric System ***Description:*** This effort is part of the climate change initiative to reduce vehicle platform carbon emissions through development of hybrid electric, anti-idle and multi-vehicle power networking capabilities for tactical and wheeled platforms.	-	6.282	5.767

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BH6 / *Platform Electrification and Mobility Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Mature hybrid electric technologies and multi-vehicle power networking node. Develop integration software for anti-idle, high voltage energy storage, and hybrid functions of regenerative braking, electric launch assist, and mobility optimization. Develop the supervisory control system that integrates the subsystems into a cohesive propulsion system including motoring and generating. Develop and integrate a multi-vehicle microgrid dashboard.			
FY 2024 Plans: Will validate subsystems for the electrically controlled clutch and multi-vehicle networking node. Will validate integration software and supervisory control system in a systems integration laboratory. Will integrate components into a tactical vehicle system evaluation.			
FY 2023 to FY 2024 Increase/Decrease Statement: This effort builds on previous development and then completes with evaluation in FY25.			
Title: Battery Technologies for Supply Chain Security	-	8.547	16.656
Description: This effort researches technologies that mitigate battery supply chain security issues as it relates to common military form factors that are critical to military ground vehicle electrification and other Army battery applications. This effort is part of a coordinated effort to conduct assessments of technologies across the Defense Advanced Battery Supply Chain along with DoD battery technology projects in PEs 0603342D8Z, 0605798D8Z, 0603680D8Z, 0607210D8Z, 0605805Z, 0603724N, and 0901212N. ***FY 2023 Plans:*** Provide an assessment of industrial base risk in battery component technologies, quantifying the battery designs and common form factors needed to support future capability, and the current risk of exposure of those battery components to foreign supply influence. This assessment will inform follow on research into batteries and battery chemistries and materials that can be domestically sourced. Begin to mature, integrate, and demonstrate small battery types (such as BB2590 and Small Tactical Universal Battery (STUBS)) in vehicle and other communications-electronics applications to develop a pathway for the adoption of these standard form factor batteries. Exploit mature 6T common form factor Li-ion (Lithium ion) battery technology to demonstrate alternative uses to accelerate the electrification of other Army and DOD platforms. Validate capabilities to evaluate commercial energy storage technologies in military vehicle and other conditions. ***FY 2024 Plans:*** Will provide an advanced high voltage battery testing capability that can be leveraged to exploit commercial automotive energy storage technologies for military applications. Enhanced capability will be used to validate commercial automotive battery technologies in military specific environmental conditions to develop a gap analysis of how the commercial battery will survive in a			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
military unique environment. This gap analysis will allow for design optimization of commercial technologies to facilitate improved system performance in military vehicle applications. Will exploit testing capability to validate and demonstrate scale-able battery technologies for various DOD vehicle applications. Will optimize and mature 6T common form factor Li-ion (Lithium ion) battery technology and packaging to demonstrate alternative uses for the standardized battery to accelerate the electrification of other Army and DOD platforms. Will validate system level safety testing to provide an accelerated pathway for Li-ion 6T implementation. Will leverage industrial base assessment to design and develop Li-ion 6T battery technologies with higher percentages of domestically sourced cells and materials. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase to address defense wide critical battery supply chain issues and test capabilities that would prevent the Army from fielding electrified platforms.			
Title: SBIR/STTR Transfer	-	0.951	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: Combat Vehicle Hybrid Electric Capability Demonstration	-	-	8.764
Description: This effort is part of the climate change initiative to reduce vehicle platform carbon emissions through development and demonstration of hybrid electric and battery dominant vehicles. This effort matures technology to perform rapid recharging of electric vehicles in battlefield environments. This effort demonstrates capabilities applicable to both wheeled tactical vehicles and tracked combat vehicles. *FY 2024 Plans:* Will validate parallel hybrid design architectures for medium combat tracked vehicle platforms. Will perform concepting studies and analysis of potential technology solutions to improve vehicle performance, offer silent mobility, and improve fuel efficiency. Will conduct soldier operated demonstrations and gather feedback to refine hybrid system operations. Will evaluate a mobile system to include power generation and distribution to combat/tactical electrified vehicles. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects work on tracked combat systems and battlefield charging.			
Accomplishments/Planned Programs Subtotals	29.997	46.679	65.647

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C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Appropriation/Budget Activity 2040 *I* 3	R-1 Program Element (Number/Name) PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	Project (Number/Name) BH8 *I Enhanced VETRONICS Advanced Technology*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BH8: *Enhanced VETRONICS Advanced Technology*	-	9.227	10.776	10.268	-	10.268	10.618	9.378	12.735	12.873	0.000	75.875
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, integrates, and demonstrates vehicle electronics hardware such as computers, sensors, communications systems, displays, and vehicle command/control/driving mechanisms as well as vehicle software to enhance crew performance, increase vehicle fuel efficiency, reduce Size, Weight, and Power (SWaP) burdens and reduce vehicle maintenance costs. This Project also exploits open system architectures (power and data) for military ground vehicles to enable common interfaces, standards and hardware implementations. The overall vehicle system architecture approach provides an open architecture such as the Vehicle Integration for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance / Electronic Warfare (C4ISR/EW) Interoperability (VICTORY), to allow platforms to accept future technologies without the need for significant re-design as new technologies are developed and integrated. Additionally, this project matures infrastructure that enables the ease of integration of autonomous subsystem technologies into future and existing tactical and combat vehicle architectures. Technical challenges include software and algorithm development for increased levels of automation for both manned and unmanned systems, secure vehicle data networks, interoperability of intra-vehicle and inter-vehicle systems, and implementation of advanced user interfaces. Overcoming these technical challenges enables improved and increased span of collaborative vehicle operations, efficient workload management, commander's decision aids, embedded simulation for battlefield visualization and fully integrated virtual test/evaluation.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Enhanced - Vehicle Electronics (E-Vetronics)	9.227	10.776	10.268
Description: This effort addressed technical and integration challenges in the areas of vehicle architecture and systems integration. Specifically, this effort focused on maturing and demonstrating a common ground vehicle open architecture with distributed display processing architecture, computing hardware capable of being re-configured to adapt to changes in Input / Output (I/O) needs, advanced network video distribution, advancements in slip ring technology, tactical situational awareness (SA), cooperative engagement and mission package integration through open architecture components and software. These			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BH8 *I Enhanced VETRONICS Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
efforts enabled future vehicle capabilities, reduced dependencies on proprietary solutions, and supported increased market competition through open architecture components and software. This effort created the electronics architecture for future ground combat vehicles to enable software and hardware commonality and reduce system integration timing and cost. *FY 2023 Plans:* Improve the ground vehicle common architecture, tactical situational awareness, and digital containerization lines of efforts. Integrate mission packages for key network functions within the common network architecture. Demonstrate open system architecture to include objective hardware available to conduct bench level demonstration. *FY 2024 Plans:* Will mature the ground vehicle common architecture, tactical situational awareness, and advanced digital visual network lines of efforts; optimize mission package integration for key network functions within the common network architecture and validate components; mature and demonstrate open system architecture products to include objective hardware available to conduct bench level demonstration; optimize the electronics architecture for future ground combat vehicles to enable software and hardware commonality and reduce system integration timing and cost. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort			
Accomplishments/Planned Programs Subtotals	9.227	10.776	10.268

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*					**Project (Number/Name)** BI3 *I Sensor Protection Advanced Technology*	
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BI3: *Sensor Protection Advanced Technology*	-	1.585	1.708	1.746	-	1.746	1.748	1.745	1.747	1.766	0.000	12.045
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates novel sensor protection capabilities which dramatically reduce the susceptibility of our thermal electro-optic/infrared (EO/IR) sensors to ever increasing threats on the battlefield. This Project enables continuation of the mission despite potential threat laser engagements. Low cost modular solutions will be demonstrated that can be applied across current and planned EO/IR targeting, surveillance, and situational awareness sensor systems against existing and emerging threats in support of combined arms maneuver.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle, Soldier Lethality, and Future Vertical Lift Army Modernization Priorities.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology), 0602143A (Soldier Lethality Technology), 0603465A (Future Vertical Lift Advanced Technology) and 0603118A (Soldier Lethality Advanced Technology).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Sensor Protection Advanced Technology	1.585	1.666	1.746
Description: This effort will mature and demonstrate sensor protection and signature reduction capabilities which better ensure sensors are difficult to detect, dazzle, and damage by current and future laser threats.			
FY 2023 Plans: Optimize longwave infrared (LWIR) filter coatings for newly available high sensitivity uncooled bolometer cameras. Demonstrate effectiveness of visible filter materials against relevant commercially available visible laser threats.			
FY 2024 Plans: Will optimize optical coating processes and materials for high performance cooled infrared systems to reduce reflections and improve signature management; mature and demonstrate a laser ID algorithm that detects an adversarial laser incident in a high performance IR sensor's imagery and reports the associated adversary laser band that is detected.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BI3 / *Sensor Protection Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned lifecycle of this effort			
Title: SBIR/STTR Transfer	-	0.042	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	1.585	1.708	1.746

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*			**Project (Number/Name)** BI5 *I Materials Application and Integration Adv Tech*				
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BI5: *Materials Application and Integration Adv Tech*	-	4.645	5.279	5.502	-	5.502	4.606	4.767	4.769	4.821	0.000	34.389
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, integrates, and demonstrates lightweight novel materials, integrated computational materials engineering methods, and new manufacturing processes and methodologies. These materials and technologies enable the Army to address critical areas of survivability, mobility, and transportability within the Next Generation Combat Vehicle (NGCV).

This Project also continues the efforts originally started under Advanced Vehicle Power Technology Alliance (AVPTA) between the Department of Energy and the Department of the Army with a focus on developing advanced materials technologies that enable military ground vehicles to become significantly more energy efficient. The AVPTA, though no longer chartered, has developed a relationship between DoE and DA that continues to accelerate the conceptualization and transition to deployment of inventive and creative energy-saving concepts that the Nation needs to achieve energy security. In support of lighter military vehicles which are more fuel-efficient and capable in expeditionary scenarios, this project will mature and integrate lightweight materials and joining technologies to provide superior mobility and protection of both vehicles and occupants.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: System Design Optimization for Lightweighting	3.992	4.544	4.757
Description: This effort improves technologies, tools, and advanced manufacturing techniques in support of the Army's mission to increase mobility, protection, and transportability while reducing weight. This effort focuses on maturing and demonstrating technologies to decrease ground vehicle weight while optimizing performances and enabling the Army trade space for enhanced capabilities. The technologies being demonstrated are in the fields of material maturation, design optimization, operational metrics, joining technologies, and additive manufacturing.			

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BI5 *I Materials Application and Integration Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Continue to improve the Fiscal Year 2022 (FY22) plan for advanced lightweight armor and high-temperature / high-friction surface materials utilizing improvements made to virtual prototyping, additive manufacturing, and integration / joining techniques. Mature and demonstrate lightweight, topology optimized ballistic casting for combat weapon systems. Continue to mature and demonstrate advanced additive manufacturing feedstocks and processes for design optimization to achieve component and sub-system performance metrics, simplify complexity for reduced material waste, and reduce overall weight. Determine target integration processes for materials joining to include designs for advanced armor materials. *FY 2024 Plans:* Will mature rapid screening methods for novel, high-entropy alloys and evaluation of the process to predict the likelihood of their successful maturation; complete initial stage of integrated computational materials engineering (ICME) development resulting in the use of new technical capabilities and toolsets to understand and optimize at a component level (rather than at a fundamental or finite element level); validate ICME efforts by evaluating materials to develop robust material properties, further improving modeling and simulation for virtual prototyping; mature advanced testing methods at sub-scale, which will lead to faster results than conventional testing, thus accelerating novel material screening and maturation cycles; manufacture two alloy weld wires that can be used in wire additive processes to produce high strength components with the potential to replace high strength steel castings; complete Directed Energy Deposition (DED) design guidelines to evaluate candidate parts for advanced manufacturing processes, process parameters for the operation of the equipment as well as mechanical and materials performance metrics for part qualification and justification. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: Advanced Vehicle Power Technology Alliance - Materials *Description:* This effort matures and demonstrates lightweight materials and joining technologies in support of lighter military vehicles which are more fuel-efficient and expeditionary with superior mobility and protection of both vehicles and occupants. Lighter materials/constructions and advances in joining technologies such as multi-material and dissimilar material joining will lead to lightweight military vehicle structures. *FY 2023 Plans:* Mature and demonstrate advanced/lightweight materials for weight optimization, energy storage/transfer, and protection such as Copper,Tantalum (CuTa) for conductive materials for energy transfer and high temperature alloys for critical engine components. Validate manufacturing, machining, and corrosion performance for these materials. *FY 2024 Plans:*	0.653	0.735	0.745

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BI5 *I Materials Application and Integration Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will evaluate materials for integration into battery containment, powertrain weight and/or space claim reduction, and multifunctional structural energy storage to enable increased vehicle electrification of ground vehicles. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	4.645	5.279	5.502

C. Other Program Funding Summary ($ in Millions)
  N/A
Remarks

D. Acquisition Strategy
  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*				**Project (Number/Name)** BJ1 *I Vehicle System Security Advanced Technology*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BJ1: *Vehicle System Security Advanced Technology*	-	2.365	-	-	-	-	-	-	-	-	0.000	2.365
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates ground vehicle cyber protection and resilience technologies to increase the cybersecurity of ground vehicles and ensure their continued operation in near-peer cyber contested environments. This Project will mature cybersecurity technologies at the platform level to defeat cybersecurity threats and maintain assured vehicle functionality and freedom of maneuver in the cyber warfighting domain.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Vehicle System Security Advanced Technology	2.365	-	-
Description: This effort matures and demonstrates technologies required to maintain operating tempo and overmatch capability during offensive digital attacks to military ground vehicle systems. Additionally, the effort will maintain critical vehicle functionality in peer and near-peer cyber-contested environments. The effort will also mature and demonstrate technologies to mitigate risk of future and emerging cyber vulnerabilities by designing highly assured systems with cybersecurity designed from the beginning.			
Accomplishments/Planned Programs Subtotals	2.365	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603462A / Next Generation Combat Vehicle Advanced Technology				**Project (Number/Name)** BK1 / Autonomous Mobility Adv Tech			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BK1: *Autonomous Mobility Adv Tech*	-	5.859	6.221	5.305	-	5.305	5.316	-	-	-	0.000	22.701
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates data-based Artificial Intelligence and Machine Learning (AI/ML) technologies to increase autonomy and mobility and perform teamed operations with manned and unmanned air and ground vehicles in a military relevant environment through data collection on relevant platforms. Data collection will involve both simulation and live collection. Simulation will provide a baseline to correctly collect, clean, and analyze data that meets the need for improving algorithms for both formation control and unmanned aerial vehicle map input for unmanned ground vehicle mobility, while reducing costs. Live data will start with Surrogate platforms in local areas. The Project will use AI/ML techniques to mature and demonstrate intelligent formation control to be used in complex, off-road terrain without the need for a global positioning system (GPS). Data will be collected from mounted platforms utilizing sensors to improve algorithms for relative and absolute positioning, undistributed formation control, and increased speeds of unmanned platforms. The utility of the military-relevant data will be demonstrated through a datahub which is designed specifically for robotic data types, formats and sizes. The datahub infrastructure is a unique solution to handle such ground vehicle data needs and will be able to optimize the outcome of the collected data. Also, the Project will use AI/ML techniques to optimize intelligent autonomous ground platform planning team with Unmanned Aerial Systems (UAS). Data collected from air vehicles will be converted to maneuverable information for unmanned ground platforms with the identification of obstacles, go/no-go areas, terrain classification, and optimal suggested paths.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy .

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Machine Learning Data Collection	3.261	1.726	1.558
Description: This effort matures and demonstrates techniques and technologies for mass unmanned ground vehicle data collection to be used towards Army research in autonomy and mobility with machine learning efforts. **FY 2023 Plans:**			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BK1 / *Autonomous Mobility Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Collect data from sensor and robotic ground vehicles at multiple sites to provide a database of diverse environments and scenarios. Process the data and ingest it into the project data environment to make it available for visualization, searching, sharing and ML development. *FY 2024 Plans:* Will optimize and demonstrate the datahub (project data environment) infrastructure to properly interface with ML and AI development environments to leverage the unique, military-relevant collected and hosted data in the project for the development of new robotic and autonomous ground vehicle capabilities for improved mobility and maneuver. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle progression			
Title: UAS Mapping *Description:* This effort matures and demonstrates the use of combined UAS and ground system (UGV) data with ML techniques to develop intelligent unmanned ground system path planning. Data collected from UAS will be converted to maneuverable information for unmanned ground platform to help with the identification of enemy positions, go/no-go areas, terrain classification, and optimal suggested paths. *FY 2023 Plans:* Mature and demonstrate teaming of unmanned air and ground vehicles in challenging environments such as mapping under canopies and in complex terrains with limited line-of-sight to validate the robustness and utility of teamed UAS/UGS to improve mobility in varying scenarios. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle of this effort to complete in FY 2023.	2.598	1.581	-
Title: Formation Control *Description:* This effort uses ML techniques to develop intelligent formation control for manned and unmanned ground vehicles to be used on maintained roads and in contested environments under electronic warfare (EW) and GPS-denied conditions. Data will be collected from mounted platforms utilizing special internal and external sensors to develop and demonstrate algorithms for exact positioning, undistributed formation control, and increased speed. *FY 2023 Plans:* Perform simulation and data collection and analysis of ML models and algorithms; collect experimental data while conducting a live demonstration of ML models and algorithms for formation control tactical maneuvers of robotic ground vehicles. *FY 2024 Plans:*	-	2.914	3.747

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PE 0603462A / *Next Generation Combat Vehicle Advanced Technology* | Project (Number/Name)
BK1 / *Autonomous Mobility Adv Tech* |

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will optimize the performance of the ML models for multi-vehicle maneuver to approach manned-vehicle formation control performance in relative and absolute positioning and under specific mission goals and context. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle progression			
Accomplishments/Planned Programs Subtotals	5.859	6.221	5.305

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603462A I Next Generation Combat Vehicle Advanced Technology						Project (Number/Name) BK4 I Next Gen Intelligent Fire Control(NG-IFC) Adv Tech	
COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BK4: *Next Gen Intelligent Fire Control(NG-IFC) Adv Tech*	-	1.664	2.198	4.328	-	4.328	-	-	-	-	0.000	8.190
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate armament specific hardware, algorithms and architectures to support the Next Generation Combat Vehicle with the necessary fire control on future manned and unmanned platforms.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority .

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is related to and fully integrated with the efforts funded in Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Next Generation Intelligent Fire Control	1.664	2.118	2.328
Description: This effort will deliver armament specific hardware, algorithms and architectures to support the Next Generation Combat Vehicle with the necessary fire control on future manned and unmanned platforms. *FY 2023 Plans:* Optimize fire control and modeling characteristics to improve performance of target prioritization models for current and future direct fire platforms. Mature and demonstrate the model characteristics by assessing performance against specified targets and scenarios. *FY 2024 Plans:* Will optimize, mature and demonstrate fire control hardware and software to address current and future turreted systems' performance requirements. Will demonstrate improvement to operator's decision-making time by using advanced algorithms to optimize engagement priority in a target rich environment. Will optimize model characteristics by assessing performance against specified targets and scenarios. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BK4 *I Next Gen Intelligent Fire Control(NG-IFC) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.080	-
Description: Funding transferred in accordance with Title 15 USC §638			
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Title: Integration Compliant Fire Control Lethality Architecture	-	-	2.000
Description: This effort will deliver armament fire control hardware and software that will be compliant to integrate with Next Generation Combat Vehicle architecture for direct fire platforms.			
FY 2024 Plans: Will mature and?demonstrate armament specific hardware and software algorithms, and open architectures for future manned and unmanned direct fire platforms. Will integrate fire-control software into open architecture Armament Mission Computer fire control hardware.			
FY 2023 to FY 2024 Increase/Decrease Statement: In FY 2024 this effort is initiated as new start in this project.			
Accomplishments/Planned Programs Subtotals	1.664	2.198	4.328

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603462A I Next Generation Combat Vehicle Advanced Technology				**Project (Number/Name)** BK6 I Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BK6: *Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech*	-	-	1.534	2.062	-	2.062	9.905	12.292	12.716	12.854	0.000	51.363
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies for large caliber direct fire light-weight armament systems that will exceed the current capability of 120 millimeter (mm) direct fire cannons and be optimized for future operational environment with cross-domain engagement capability. Specifically, this Project integrates and demonstrates technologies for rapid fire on-the-move at all elevations (direct & indirect), compact ammunition design with advanced ignition, advanced recoil mitigation to reduce impulse and allow integration onto lighter platforms, automated ammunition handling and reloading. This Project also supports open architecture to enable supervised autonomy and remote operation and integrates intelligent fire control to address multi-domain targets from manned and unmanned platforms.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is related to and fully integrated with the efforts funded in Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) and PE 0604115A (Technology Maturation Initiatives).

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: Large Caliber Armament System (LCAS)	-	1.478	2.062
Description: This effort matures and demonstrates a next generation, automated, lightweight 120-mm armament system design for Next Generation Combat Vehicle, providing tank-like lethality for light medium-weight optionally manned platforms. **FY 2023 Plans:** Demonstrate integrated technologies for improving lethal performance of direct fire projectiles. Mature armament tracking algorithms, and enhanced targeting and engagement techniques for direct fire projectiles. **FY 2024 Plans:** Will optimize technologies for improving lethal performance of direct fire projectiles against emerging threats. Will mature direct fire projectile component technologies and methodologies to increase munition effectiveness against emerging threats. **FY 2023 to FY 2024 Increase/Decrease Statement:**			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603462A I Next Generation Combat Vehicle Advanced Technology	**Project (Number/Name)** BK6 I Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.056	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	-	1.534	2.062

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603462A I *Next Generation Combat Vehicle Advanced Technology*					**Project (Number/Name)** BP6 I *Ground Vehicle Advanced Technology(CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BP6: *Ground Vehicle Advanced Technology(CA)*	-	135.250	278.450	-	-	-	-	-	-	-	0.000	413.700
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Congressional Interest Item funding provided for Ground Vehicle Advanced Technology.

A. Mission Description and Budget Item Justification
 Congressional Interest Item funding provided for Ground Vehicle Advanced Technology.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Program Increase - Additive Manufacturing for Jointless Hull	15.000	20.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Additive Manufacturing for Jointless Hull		
FY 2023 Plans: Congressional Interest Item funding provided for Additive Manufacturing for Jointless Hull		
Congressional Add: Carbon Fiber and Graphite Foam Technology	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam		
Congressional Add: Program Increase - ATE5.2 Engine Development	5.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for ATE5.2 Engine Development		
FY 2023 Plans: Congressional Interest Item funding provided for ATE5.2 Engine Development		
Congressional Add: Combat Vehicle Weight Reduction Initiative	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Combat Vehicle Weight Reduction Initiative		
Congressional Add: Program Increase - Virtual and Physical Prototyping	8.000	8.000

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Virtual and Physical Prototyping		
FY 2023 Plans: Congressional Interest Item funding provided for Virtual and Physical Prototyping		
Congressional Add: Program Increase - HMMWV Automotive Enhancements	3.000	9.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for HMMWV Automotive Enhancements		
FY 2023 Plans: Congressional Interest Item funding provided for HMMWV Automotive Enhancements		
Congressional Add: Program Increase - Advanced Adhesives	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Advanced Adhesives		
FY 2023 Plans: Congressional Interest Item funding provided for Advanced Adhesives		
Congressional Add: Program Increase - Combat Vehicle Lithium 6T Battery Development	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Combat Vehicle Lithium 6T Battery Development		
Congressional Add: Advanced Materials Applications	12.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Advanced Materials Applications		
Congressional Add: Augmented Reality for Denied Environments	7.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Augmented Reality for Denied Environments		
Congressional Add: Program Increase - Autonomous Minefield Clearance	7.000	8.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Autonomous Minefield Clearance		
FY 2023 Plans: Congressional Interest Item funding provided for Autonomous Minefield Clearance		
Congressional Add: Autonomous Vehicle Mobility	10.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Autonomous Vehicle Mobility		
Congressional Add: Program Increase - Carbon Fiber Tires	5.000	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Carbon Fiber Tires		
FY 2023 Plans: Congressional Interest Item funding provided for Carbon Fiber TIres		
Congressional Add: Force Protection Vehicle Kit	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Force Protection Vehicle Kit		
Congressional Add: Fuel Cell Technology	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Fuel Cell Technology		
Congressional Add: Program Increase - Machine Learning for Advanced Lightweight Combat Vehicle Structures	6.000	19.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Machine Learning for Advanced Lightweight Combat Vehicle Structures		
FY 2023 Plans: Congressional Interest Item funding provided for Machine Learning for Advanced Lightweight Combat Vehicle Structures		
Congressional Add: Program Increase - Maneuverable Lightweight Electric Weight Reducer	5.000	7.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Maneuverable Lightweight Electric Weight Reducer		
FY 2023 Plans: Congressional Interest Item funding provided for Maneuverable Lightweight Electric Weight Reducer		
Congressional Add: Program Increase - Off-Road Maneuver	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Off-Road Maneuver		
FY 2023 Plans: Congressional Interest Item funding provided for Off-Road Maneuver		
Congressional Add: Program Increase - Predictive Maintenance System	2.000	2.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Predictive Maintenance System		
FY 2023 Plans: Congressional Interest Item funding provided for Predictive Maintenance System		
Congressional Add: RCV-L	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for RCV-L		
Congressional Add: Short Fiber Thermoplastic Applications	4.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			**Date:** March 2023
Appropriation/Budget Activity 2040 / 3		**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BP6 / *Ground Vehicle Advanced Technology(CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2022 Accomplishments: Congressional Interest Item funding provided for Short Fiber Thermoplastic Applications		
Congressional Add: Program Increase - Unmanned Navigational Technology	2.500	3.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Unmanned Navigational Technology		
FY 2023 Plans: Congressional Interest Item funding provided for Unmanned Navigational Technology		
Congressional Add: Virtual Autonomy Environment	3.750	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Virtual Autonomy Environment		
Congressional Add: Program Increase - AUGMENTED REALITY FOR DENIED ENVIRONMENTS	-	7.000
FY 2023 Plans: Congressional Interest Item funding provided for Augmented Reality for Denied Environments		
Congressional Add: Program Increase - AUTONOMOUS SYSTEMS FOR MILITARY GROUND VEHICLES	-	3.750
FY 2023 Plans: Congressional Interest Item funding provided for AUTONOMOUS SYSTEMS FOR MILITARY GROUND VEHICLES		
Congressional Add: Program Increase - CYBERSECURITY FOR AUTONOMOUS GROUND VEHICLES	-	9.000
FY 2023 Plans: Congressional Interest Item funding provided for CYBERSECURITY FOR AUTONOMOUS GROUND VEHICLES		
Congressional Add: Program Increase - CYBERSECURITY FOR AUTONOMOUS VEHICLES	-	4.200
FY 2023 Plans: Congressional Interest Item funding provided for CYBERSECURITY FOR AUTONOMOUS VEHICLES		
Congressional Add: Program Increase - DIGITAL ENTERPRISE TECHNOLOGY FOR OMFV	-	15.000
FY 2023 Plans: Congressional Interest Item funding provided for DIGITAL ENTERPRISE TECHNOLOGY FOR OMFV		
Congressional Add: Program Increase - DIGITAL TWIN	-	7.000
FY 2023 Plans: Congressional Interest Item funding provided for Digital Twin		
Congressional Add: Program Increase - ELECTRIC DRIVE SYSTEM	-	5.500

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for Electric Drive System		
Congressional Add: Program Increase - ELECTRIFIED VEHICLE INFRARED SIGNATURE MANAGEMENT	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for ELECTRIFIED VEHICLE INFRARED SIGNATURE MANAGEMENT		
Congressional Add: Program Increase - ELECTRON BEAM ADDITIVE MANUFACTURING OF CRITICAL METAL RING COMPONENTS	-	2.000
FY 2023 Plans: Congressional Interest Item funding provided for ELECTRON BEAM ADDITIVE MANUFACTURING OF CRITICAL METAL RING COMPONENTS		
Congressional Add: Program Increase - ENHANCED LETHALITY ON ARMY SMALL MULTIPURPOSE EQUIPMENT TRANSPORT	-	8.000
FY 2023 Plans: Congressional Interest Item funding provided for ENHANCED LETHALITY ON ARMY SMALL MULTIPURPOSE EQUIPMENT TRANSPORT		
Congressional Add: Program Increase - HMMWV OCCUPANCY PROTECTION DEVELOPMENT	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for HMMWV OCCUPANCY PROTECTION DEVELOPMENT		
Congressional Add: Program Increase - HUMAN DIGITAL TWINS AND HUMAN-MACHINE INTERACTION	-	6.000
FY 2023 Plans: Congressional Interest Item funding provided for HUMAN DIGITAL TWINS AND HUMAN-MACHINE INTERACTION		
Congressional Add: Program Increase - MODELING AND SIMULATION ACTIVITIES FOR VEHICLE DEVELOPMENT	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for MODELING AND SIMULATION ACTIVITIES FOR VEHICLE DEVELOPMENT		
Congressional Add: Program Increase - MODULAR ELECTRIC MOTORS	-	5.500
FY 2023 Plans: Congressional Interest Item funding provided for Modular Electric Motors		
Congressional Add: Program Increase - MULTI-SERVICE ELECTRO-OPTICAL SIGNATURE CODE	-	9.000

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for MULTI-SERVICE ELECTRO-OPTICAL SIGNATURE CODE		
Congressional Add: Program Increase - NANO-LED FABRICATION FOR AUGMENTED REALITY CONTACT LENS	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for NANO-LED FABRICATION FOR AUGMENTED REALITY CONTACT LENS		
Congressional Add: Program Increase - NEXT GENERATION ELECTRIFIED TRANSMISSION	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for NEXT GENERATION ELECTRIFIED TRANSMISSION		
Congressional Add: Program Increase - NEXT GENERATION LIGHT TACTICAL VEHICLE MANEUVER AUTONOMY	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for NEXT GENERATION LIGHT TACTICAL VEHICLE MANEUVER AUTONOMY		
Congressional Add: Program Increase - SYNTHETIC GRAPHITE BATTERY	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for Synthetic Graphite Battery		
Congressional Add: Program Increase - VEHICLE TECHNOLOGY READINESS LEVELS	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for VEHICLE TECHNOLOGY READINESS LEVELS		
Congressional Add: Program Increase - ABRAMS MODERNIZATION	-	30.000
FY 2023 Plans: Congressional Interest Item funding provided for ABRAMS Modernization		
Congressional Add: Program Increase - SMALL UNIT GROUND ROBOTIC CAPABILITIES	-	7.000
FY 2023 Plans: Congressional Interest Item funding provided for Small Unit Ground Robotic Capabilities		
Congressional Adds Subtotals	135.250	278.450

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603462A / *Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BP6 / *Ground Vehicle Advanced Technology(CA)*

D. Acquisition Strategy

  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*				**Project (Number/Name)** BZ9 *I Smart Targeting Environment for Lower Level Assets*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BZ9: *Smart Targeting Environment for Lower Level Assets*	-	3.775	3.381	4.402	-	4.402	4.418	-	-	-	0.000	15.976
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates mission targeting support software and algorithms, to include Electronic Warfare capabilities, leveraged from the Defense Advanced Research Project Agency (DARPA) System-of-System Enhanced Small Unit (SESU), current force, and Science and Technology (S&T) in order to enable small units to continuously build and share targeting data and access strike assets in multi-domain operations.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Small Targeting Environment for Lower Level Assets (STELLA) *Description:* This effort matures and demonstrates integrated target search and electronic warfare data dissemination algorithms to speed the overall targeting process. This improved process will utilize automated target search algorithms based on mission parameters to reduce processing time and interface with systems for detecting concealed targets and setting target priority. It will fuse local data processing and payload data to increase accuracy for target engagement, optimize data dissemination algorithms based on local network conditions, and streamline interfaces for small units to access joint strike assets. *FY 2023 Plans:* Implement pairing of electronic warfare target effects in coordination with kinetic effects. Evaluate additional electronic warfare system use cases and develop end-to-end system demonstrations. Conduct Soldier evaluations and laboratory and field-based demonstrations to ensure project meets threshold metrics. *FY 2024 Plans:* Will develop electronic warfare capability datasets to be used in conjunction with pairing of effects. Will mature pairing of electronic warfare target effects in coordination with kinetic effects. Will evaluate additional electronic warfare system use cases and develop end-to-end system demonstrations. Will conduct larger-scale, field-based demonstration activities to ensure project	3.775	3.331	4.402

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603462A *I Next Generation Combat Vehicle Advanced Technology*	**Project (Number/Name)** BZ9 *I Smart Targeting Environment for Lower Level Assets*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
meets threshold metrics. Will conduct additional Soldier Touchpoint evaluations to refine front-end user interfaces. Will pursue information assurance activities and generation of necessary artifacts for authority to operate on military networks. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects effort to execute larger scale demonstration activities in final two years of effort to meet information assurance requirements and produce software documentation required for successful transition.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.050	-
Accomplishments/Planned Programs Subtotals	3.775	3.381	4.402

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*						
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	205.576	177.917	105.549	-	105.549	107.608	118.061	131.174	126.981	0.000	972.866
AM7: *Modular RF Communications Advanced Technology*	-	8.931	10.440	-	-	-	1.989	13.293	12.777	12.917	0.000	60.347
AM9: *Protected SATCOM Advanced Technology*	-	24.561	31.599	14.200	-	14.200	-	14.171	15.600	18.007	0.000	118.138
AN2: *Narrowband SATCOM Advanced Technology*	-	11.166	-	-	-	-	-	-	-	-	0.000	11.166
AN4: *Non Traditional Waveforms Advanced Technology*	-	8.960	5.905	5.215	-	5.215	20.286	11.615	11.590	17.211	0.000	80.782
AN8: *COE - Every Receiver is a Sensor Advanced Tech*	-	2.782	1.371	6.539	-	6.539	6.469	6.477	6.482	3.244	0.000	33.364
AO1: *UNT - Every Receiver is a Sensor Advanced Tech*	-	2.837	-	3.170	-	3.170	3.171	3.175	3.176	-	0.000	15.529
AO7: *EW for Maneuver Operations (EMO) Adv Tech*	-	5.557	6.125	3.152	-	3.152	-	-	3.700	3.735	0.000	22.269
AP9: *Next Generation HF Advanced Technology*	-	7.444	-	-	-	-	-	-	-	-	0.000	7.444
AQ5: *Sensor CE-Integrated Sensor Architecture Adv Tech*	-	1.585	0.625	1.955	-	1.955	1.977	1.976	1.977	1.999	0.000	12.094
AQ8: *High Tempo Data Driven Decision Tools Adv Tech*	-	2.985	6.611	3.602	-	3.602	3.783	3.924	3.927	3.970	0.000	28.802
AR4: *Intelligent Env Battlefield Awareness Adv Tech*	-	3.927	-	-	-	-	-	-	-	-	0.000	3.927
AR6: *Understanding the Environment as a Threat Adv Tech*	-	2.432	2.767	-	-	-	1.691	-	2.017	2.523	0.000	11.430
AR8: *Sensing in Contested Environments Adv Tech*	-	1.552	-	-	-	-	-	-	-	-	0.000	1.552

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*						
AS9: *Persistent Geophysical Sensing-Infrasound Adv Tech*	-	2.359	-	-	-	-	-	-	-	-	0.000	2.359
AT3: *Subterranean Detection and Monitoring Adv Tech*	-	2.136	-	-	-	-	-	-	-	-	0.000	2.136
AT8: *Network-Enabled GeoSpatial-GEOINT Services AdvTech*	-	2.947	4.603	4.760	-	4.760	4.201	5.451	6.188	4.576	0.000	32.726
AU1: *Tactical GeoSpatial Information Capabilities ATech*	-	4.053	5.996	2.112	-	2.112	2.717	4.476	7.674	4.713	0.000	31.741
AU2: *Optimization of Geospatial Data for Visualization*	-	2.092	-	-	-	-	-	-	-	-	0.000	2.092
AU4: *Geospatially Enabled Operational Design Adv Tech*	-	7.665	12.197	10.953	-	10.953	10.791	5.123	6.422	8.178	0.000	61.329
AV1: *GEOInt/Ops Logistics Integration-Planning Adv Tech*	-	3.726	-	-	-	-	-	-	-	-	0.000	3.726
AV4: *Foundational S&T for Network C3I Advanced Tech*	-	7.468	0.851	-	-	-	-	-	-	-	0.000	8.319
AV8: *Navigation Warfare (NAVWAR) Advanced Technology*	-	1.856	1.949	6.029	-	6.029	3.980	6.024	-	3.465	0.000	23.303
AW6: *Modular GPS Independent Sensors Advanced Tech*	-	6.542	10.131	12.343	-	12.343	14.732	6.459	12.491	4.784	0.000	67.482
BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*	-	55.500	52.500	-	-	-	-	-	-	-	0.000	108.000
CF9: *Automated IPB Adv Tech*	-	0.953	-	-	-	-	-	-	-	-	0.000	0.953
CI7: *Mobile & Survivable Command Post (MASCP) Adv Tech*	-	7.524	13.119	18.691	-	18.691	16.424	19.857	19.871	20.087	0.000	115.573
CJ8: *Assured PNT Communications Advanced Tech*	-	16.036	11.128	11.783	-	11.783	13.411	14.052	14.141	14.296	0.000	94.847

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army	**Date:** March 2023
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DB6: *Pathfinder 3D Advanced Technology*	-	-	-	1.045	-	1.045	1.986	1.988	3.141	3.276	0.000	11.436

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates technologies to provide an Army tactical network and enabling infrastructure that support operations in any environment, to include where the electromagnetic spectrum is denied or degraded. This is accomplished through the exploitation and optimization of components and systems for robust, low signature communications and data networks; assured positioning, navigation, and timing in contested environments; converged and coordinated cyber and electronic warfare activities; resilient mission command on the move; and the collection, processing, and dissemination of information for intelligence, surveillance, and reconnaissance in a common operating picture.

Work in this PE complements PE 0602146A (Network C3I Technology), PE 0602143A (Soldier Lethality Technology), PE 0602145A (Next Generation Combat Vehicle Technology), PE 0602147A (Long Range Precision Fires Technology), PE 0602148A (Future Vertical Lift Technology), PE 0602150A (Air and Missile Defense Technology), PE 0602213A (C3I Applied Cyber), PE 0603118A (Soldier Lethality Advanced Technology), PE 0603462A (Next Generation Combat Vehicle Advanced Technology), PE 0603464A (Long Range Precision Fires Advanced Technology), PE 0603465A (Future Vertical Lift Advanced Technology), and PE 0603466A (Air and Missile Defense Advanced Technology).

This PE is directly aligned with the Network and Assured Positioning, Navigation, and Timing (APNT) Army Modernization priorities.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research is performed by the United States (U.S.) Army Futures Command (AFC), the U.S. Army Space and Missile Defense Command (SMDC) and U.S. Army Engineer Research and Development Center (ERDC).

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	211.068	125.565	107.766	-	107.766
Current President's Budget	205.576	177.917	105.549	-	105.549
Total Adjustments	-5.492	52.352	-2.217	-	-2.217
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	52.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-5.492	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-2.217	-	-2.217

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*

	FY 2022	FY 2023		
• FFRDC Transfer	-	-0.148	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*		
Congressional Add: *Program Increase - Assured Position, Navigation, and Timing Technology*	4.000	5.000
Congressional Add: *Program Increase - Advanced Materials for Resilient Sensors*	5.000	-
Congressional Add: *Program Increase - Tactical Geospatial Information Capabilities*	5.000	-
Congressional Add: *Program Increase - Alternative Navigation for GPS-Denied Landing Environments*	4.500	4.500
Congressional Add: *Edge-High Performance Computing for Multi-Domain Operations*	5.000	-
Congressional Add: *HALITE*	7.000	-
Congressional Add: *Program Increase - Next Generation Command Posts*	10.000	7.000
Congressional Add: *Receiver-Sensor Technology for Tactical Networks*	15.000	-
Congressional Add: *Program Increase - ADVANCE MATERIALS FOR COMMAND POST OF THE FUTURE*	-	1.500
Congressional Add: *Program Increase - ADVANCED PRECISION, NAVIGATION AND TIMING FOR LANDING ENVIRONMENTS*	-	2.500
Congressional Add: *Program Increase - HUMAN GEOGRAPHY REPOSITORY FOR COMMERCIAL CIVIL AFFAIRS*	-	5.000
Congressional Add: *Program Increase - MULTI-PLATFORM RECEIVER-SENSOR TECHNOLOGY*	-	20.000
Congressional Add: *Program Increase - SMALL SATELLITE HIGH ALTITUDE LAUNCH, INTEGRATION, TEST, AND EVALUATION*	-	7.000
Congressional Add Subtotals for Project: BP4	55.500	52.500
Congressional Add Totals for all Projects	55.500	52.500

Change Summary Explanation
Decreased funding to support higher Army priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603463A I *Network C3I Advanced Technology*				Project (Number/Name) AM7 I *Modular RF Communications Advanced Technology*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AM7: *Modular RF Communications Advanced Technology*	-	8.931	10.440	-	-	-	1.989	13.293	12.777	12.917	0.000	60.347
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2024 funding in this Project experiences a Skip Year.

A. Mission Description and Budget Item Justification

This Project optimizes autonomous networking protocols to automate the Primary, Alternate, Contingency, and Emergency (PACE) communication plan to initialize, adapt, and continue operations under changing environments and threats.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AM6 (Modular RF Communications Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Modular Radio Frequency (RF) Communications Advanced Technology	8.931	10.059	-
Description: This effort optimizes autonomous networking protocols to automate the PACE communication plan to initialize, adapt, and continue operations under changing environments and threats. *FY 2023 Plans:* Demonstrate automated PACE capabilities in simulated laboratory and field test environments. Demonstrate integrated PACE capabilities with various nodes; dismounted, mounted, command post and interface to Warfighter Information Network-Tactical (WIN-T) (dismounted and command post node variants completed in Fiscal Year 2020 (FY20), mounted node variant to be completed in FY21/FY22, WIN-T interface to be completed in FY23). Mature automated PACE decision engine features and demonstrated integration with other protected terrestrial and space-based radios/waveforms and external systems to provide input to the decision engine. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AM7 *I Modular RF Communications Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding decrease reflects planned conclusion of this effort.			
Title: SBIR/STTR Transfer	-	0.381	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	8.931	10.440	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	

Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603463A I Network C3I Advanced Technology					Project (Number/Name) AM9 I Protected SATCOM Advanced Technology			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AM9: Protected SATCOM Advanced Technology	-	24.561	31.599	14.200	-	14.200	-	14.171	15.600	18.007	0.000	118.138
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies and components to increase resiliency of Wideband Satellite Communications (SATCOM) in contested and congested electromagnetic environments. This Project improves resiliency through science & technology investigation. Will compliment technologies that provide obfuscation of radio frequency (RF) spectrum signature in order to counter enemy electronic surveillance capabilities.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects AM8 (Protected SATCOM Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Protected SATCOM Advanced Technology and Resilient Tactial Networking and Comms	24.368	30.859	14.200

Description: This effort matures and demonstrates technologies and components to increase resiliency of Wideband SATCOM in contested and congested electromagnetic environments. This effort improves resiliency through science & technology investigation. Will compliment technologies that provide obfuscation of RF spectrum signature in order to counter enemy electronic surveillance capabilities.

FY 2023 Plans:
Mature and optimize select SATCOM technologies that contribute to SATCOM resiliency; mature OTM satellite ground terminal technology that supports operation over multiple satellite constellations with low available SWAP, leading to Army communications resiliency through diversity for tactical vehicles; and will mature ATH satellite ground terminal technology that supports operation over multiple satellite constellations simultaneously, leading to Army communications resiliency through diversity for Army TOCs.

FY 2024 Plans:
Will mature, optimize, and demonstrate select SATCOM technologies that contribute to SATCOM resiliency; will mature and demonstrate OTM satellite ground terminal technology that supports operation over multiple satellite constellations with low available SWAP, leading to Army communications resiliency through diversity for tactical vehicles; and mature and demonstrate

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AM9 *I Protected SATCOM Advanced Technology*		
B. Accomplishments/Planned Programs ($ in Millions)		**FY 2022**	**FY 2023**	**FY 2024**
ATH satellite ground terminal technology that supports operation over multiple satellite constellations simultaneously, leading to Army communications resiliency through diversity for Army TOCs. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects the support required for technology maturation and optimization efforts related to OTM / ATH satellite ground terminals in the final funded year of this effort.				
Title: High Altitude: Wideband Global Satellite Communications (WGS) Ka Band Surrogate Payload / Aerial Tier Networking ***Description:*** Demonstrate a WGS surrogate payload for usage on a High Altitude Platform (HAP) with seamless transition to existing ground terminals by modifying existing solutions to support Capability Sets (CS), beginning with CS 23: Capacity & Resiliency.		0.193	-	-
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638		-	0.740	-
Accomplishments/Planned Programs Subtotals		24.561	31.599	14.200

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army						**Date:** March 2023					
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AN2 *I Narrowband SATCOM Advanced Technology*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AN2: *Narrowband SATCOM Advanced Technology*	-	11.166	-	-	-	-	-	-	-	-	0.000	11.166
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project validates and demonstrates technologies to enable gateway communications across disparate Narrowband Satellite Communications (SATCOM) networks, enabling resiliency in contested environments. The Narrowband SATCOM network is the largest tactical network operated by the Army to provide situational understanding across all echelons. This Project also optimizes technologies and protocols to enable risk mitigation solution sets and awareness through adaptive learning capabilities.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project BZ6 (Narrowband SATCOM Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Narrowband SATCOM Advanced Technology	11.166	-	-
Description: This effort validates and demonstrates technologies to enable gateway communications across disparate Narrowband SATCOM networks, enabling resiliency in contested environments.			
Accomplishments/Planned Programs Subtotals	11.166	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*					**Project (Number/Name)** AN4 I *Non Traditional Waveforms Advanced Technology*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AN4: *Non Traditional Waveforms Advanced Technology*	-	8.960	5.905	5.215	-	5.215	20.286	11.615	11.590	17.211	0.000	80.782
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates non-traditional waveforms and technologies for resilient communications in contested environments providing anti-jam, low probability of intercept, and low probability of detection for the dismounted and vehicular user. This Project also optimizes technologies not typically applied to the tactical environment, such as millimeter wave communications and directional networking with coherent combining of radio frequency signals, to maintain networked communications in and under contested and congested electromagnetic spectrum environments.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AN3 (Non Traditional Waveforms Technology) and Project AO4 (Energy Efficient Devices Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Unites States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Non Traditional Waveforms Advanced Technology	8.960	5.823	-
Description: This effort demonstrates non-traditional waveforms and technologies for resilient communications in contested environments providing anti-jam, low probability of intercept, and low probability of detection for the dismounted and vehicular user. This effort optimizes technologies not typically applied to the tactical environment, such as millimeter wave communications and directional networking with coherent combining of radio frequency signals, to maintain networked communications in and under contested and congested electromagnetic spectrum environments. *FY 2023 Plans:* Mature tactical millimeter wave communications to technology readiness level (TRL) 6. Will mature the robustness of the solution for increased reliability in on-the-move scenarios including support for vehicular (ground based) relay nodes. Develop and integrate improved hybrid beamforming (or active electronically scanned array) antennas to increase line-of-sight range and further reduce low probability of intercept/low probability of detection capability. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*	**Project (Number/Name)** AN4 I *Non Traditional Waveforms Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding decrease reflects planned lifecycle efforts to advance tactical millimeter wave communications technology, maturation to TRL 6 and completion of this effort.			
Title: SBIR/STTR Transfer	-	0.082	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: Relay for Aerial to Non-line-of-sight Ground Environments (RANGE)	-	-	5.215
Description: This effort matures and demonstrates the use of aerial platforms as communications relays ensuring communications coverage is maintained in Non-Line-of-Sight (NLOS) environments, while considering communications resiliency such as anti-jam and low probability of detection. This effort optimizes technologies not typically applied to aerial networks, such as millimeter wave communications and directional networking, to maintain networked communications in and under contested and congested electromagnetic spectrum environments. *FY 2024 Plans:* Will mature and demonstrate small form factor aerial relay communications payloads capable of enabling both low-band (e.g. L/S/C) and high-band (e.g. millimeter-wave) operations; optimize communications components for directional systems and demonstrate communications relay performance while reducing size, weight, and power of the aerial communications payload by aligning with Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Modular Open Suite of Standards (CMOSS) standards. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned initiation of this effort.			
Accomplishments/Planned Programs Subtotals	8.960	5.905	5.215

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AN4 *I Non Traditional Waveforms Advanced Technology*
D. Acquisition Strategy N/A		

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*					**Project (Number/Name)** AN8 I *COE - Every Receiver is a Sensor Advanced Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AN8: *COE - Every Receiver is a Sensor Advanced Tech*	-	2.782	1.371	6.539	-	6.539	6.469	6.477	6.482	3.244	0.000	33.364
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project optimizes automated exploitation and fusion analysis tools, applications, and software services that harvest, correlate and fuse tactical receiver sources with new and emerging data sources to improve understanding of the threat picture and more efficiently support near-real time Situational Understanding of the battlefield.

Work in this Project complements Program Element (PE) 0603463A (Network C3I Advanced Technology) / Project AO1 (UNT - Every Receiver is a Sensor Advanced Tech) and PE 0602146A (Network C3I Technology) / Project AN7 (COE - Every Receiver is a Sensor Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Data Analytics for Situational Awareness	2.782	-	-
Description: This effort improves software technologies for intelligence/mission command (MC) mission collaboration to provide faster and higher quality decision-making support for the commander and his key staff. Specific efforts focus on integrating intelligence, surveillance and reconnaissance (ISR) planning and execution at the Task Force/Battalion through troop-level, as well as efforts that provide the capability to identify, fuse, and trace/track specific targets in an asymmetric environment.			
Title: Intelligence, Surveillance and Reconnaissance Optimization for Multi-Domain Operations Support Advanced Tech	-	1.371	6.539
Description: This effort will use automated threat process to focus sensor collection requirements. Collection plans are to be synchronized across echelons optimizing scheduling and placement of sensor assets from both national and joint capabilities. *FY 2023 Plans:* Evaluate sensor optimization algorithms. Evaluate external interfaces of Program of Record (PoR) collection management platforms. *FY 2024 Plans:* Will mature and integrate sensor optimization algorithms with collection orchestration tools to reduce timeline for sensor selection and tasking; mature and demonstrate standardized messaging and interfaces for tasking Army, national, and joint sensor assets;			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AN8 *I COE - Every Receiver is a Sensor Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
mature Intelligence Surveillance and Recognizance (ISR) collection orchestration software tools to enable near-real-time cross-cueing of sensors to improve target detection, tracking, and identification. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects primary development phase, which includes development and integration of multiple subsystems necessary to demonstrate collection optimization across Army, national, and joint assets.			
Accomplishments/Planned Programs Subtotals	2.782	1.371	6.539

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*					**Project (Number/Name)** AO1 *I UNT - Every Receiver is a Sensor Advanced Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AO1: *UNT - Every Receiver is a Sensor Advanced Tech*	-	2.837	-	3.170	-	3.170	3.171	3.175	3.176	-	0.000	15.529
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates high fidelity Cyber-Electromagnetic Activity (CEMA) situational understanding by exploiting tactical receivers with sufficient capabilities as sensors. This Project also optimizes real-time radio frequency mapping of the tactical environment in support of network operation and decision making.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects AN9 (UNT - Every Receiver is a Sensor Technology) and Project AN7 (COE - Every Receiver is a Sensor Technology); and PE 0603463A (Network C3I Advanced Technology) / Project AN8 (COE Every Receiver is a Sensor Advanced Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Multi Intelligence Modernization supporting Multifunction Operations **Description:** This effort will optimize Intelligence Community investments in software frameworks and exploits against threat signals of interest (SOI) to mature a library of open, modular, and scalable software solutions that address identified capability gaps and to provide the commander with electronic situational awareness while at the same time protecting his assets from enemy deception and jamming.	2.837	-	-
Title: Multi Int Modernization Combined Architecture (MIMCA) Advanced Technology **Description:** This effort develops technologies and methodologies to overcome the interference experienced in current co-located, multifunction systems that hinders the efficient, effective execution of simultaneous Electronic Warfare (EW), signals intelligence and cyber missions. This effort will improve resourcing, scheduling and collaboration so that sensor systems can self-optimize, identify spectrum conflicts and fully utilize all available assets scheduling to enable simultaneous use of the spectrum on a threat dense battlefield. ***FY 2024 Plans:***	-	-	3.170

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AO1 *I UNT - Every Receiver is a Sensor Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will leverage advanced machine language-based resource schedulers to dynamically optimizes resource allocation on EW platforms to increase simultaneity; leverage advanced Radio Frequency (RF) payload that can accommodate an advanced scheduler, implement novel interference mitigation components, and can self-optimize based on real-time feedback from shared resources to compensate for Battle Damage Assessment (BDA) or adaptive Electronic Attack (EA). ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects planned initiation of this effort.			
Accomplishments/Planned Programs Subtotals	2.837	-	3.170

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*					**Project (Number/Name)** AO7 *I EW for Maneuver Operations (EMO) Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AO7: *EW for Maneuver Operations (EMO) Adv Tech*	-	5.557	6.125	3.152	-	3.152	-	-	3.700	3.735	0.000	22.269
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies that understand contested spectrum features, sense, locate, and cue fires missions to create windows of opportunity in Anti-Access/ Area Denial (A2/AD) environments, restore network capabilities, and enable maneuver and fires.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / AP5 (Electronic Warfare Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Electronic Warfare (EW) for Maneuver Ops **Description:** This effort matures and demonstrates hardware and software to conduct EW for intelligence, surveillance, and reconnaissance (ISR) in support of Army tactical operations.	1.672	-	-
Title: Stand-in Advanced RF Effects Advanced Technology **Description:** This effort matures and demonstrates highly advanced hardware and software to improve power-on-target for EW systems against certain threat systems. **FY 2023 Plans:** Will demonstrate Array Control Payload synchronization capabilities for distributed EW techniques. Will demonstrate complex waveforms capability at a technology readiness level (TRL) 6. Will deliver an engineering design unit for cooperative networked electronic warfare. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding change reflects planned conclusion of this effort.	2.698	2.991	-
Title: Tactical Force Signature Effects (TForSE) Advanced Technology - Counter ISR Techniques	1.187	2.976	3.152

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AO7 *I EW for Maneuver Operations (EMO) Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort matures and demonstrates Electronic Warfare capabilities against adversary counter-fire sensors and Intelligence, Surveillance, and Reconnaissance (ISR) systems leveraging high fidelity hardware-in-the-loop, modeling and simulation (M&S), and representative systems. *FY 2023 Plans:* Will integrate advanced apertures and decoy techniques into complex modeling and simulation scenarios to prove efficacy in a contested operating environment. Will demonstrate advanced aperture and decoy techniques via a field validation exercise to be determined *FY 2024 Plans:* Will use representative adversary sensor systems in a field demonstration environment, validate combined performance of decoy hardware and countermeasure techniques to reduce the effectiveness of adversary ISR and counterfire capabilities, impacting their ability to localize blue emissions and therefore target blue platforms for kinetic weapons engagements; demonstrate and document tactical placement of EW platforms to optimize countermeasure effects and to create larger regions of uncertainty. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.158	-
Accomplishments/Planned Programs Subtotals	5.557	6.125	3.152

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*					**Project (Number/Name)** AP9 / *Next Generation HF Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AP9: *Next Generation HF Advanced Technology*	-	7.444	-	-	-	-	-	-	-	-	0.000	7.444
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project improves performance of technologies to provide assured and resilient reach-back communications in satellite denied or degraded environments. This Project optimizes performance of new high frequency (HF) technology to provide low probability of detection and anti-jam capabilities to overcome emerging electronic warfare threats.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Next Generation HF Advanced Technology	7.444	-	-
Description: This effort improves performance of technologies to provide assured and resilient reach-back communications in satellite denied or degraded environments. This effort optimizes performance of HF technology to provide low probability of detection and anti-jam capabilities to overcome emerging electronic warfare threats.			
Accomplishments/Planned Programs Subtotals	7.444	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*				**Project (Number/Name)** AQ5 / *Sensor CE-Integrated Sensor Architecture Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AQ5: *Sensor CE-Integrated Sensor Architecture Adv Tech*	-	1.585	0.625	1.955	-	1.955	1.977	1.976	1.977	1.999	0.000	12.094
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a sensor interoperability architecture consisting of standards, interfaces, and services.

Work in this Project complements the Army Science and Technology Network, Next Generation Combat Vehicle, Soldier Lethality, Air and Missile Defense, Long Range Precision Fires and Future Vertical Lift modernization priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Sensor CE - Integrated Sensor Architecture	1.585	0.625	1.955
Description: This effort matures and demonstrates an agile and adaptive interoperability sensor architecture that allows a system to dynamically discover and leverage other systems on a network without any specific or prior knowledge across limited, heterogeneous resources and against a peer adversary. The goal of this effort is to develop standards, models, and protocols that provide a common language for sensor systems to connect, publish their capabilities and needs, and interact with other systems, even on disadvantaged networks. The benefits of this effort are increased sensor collaboration, reduced decision timelines, reduced soldier load, and reduced integration costs. *FY 2023 Plans:* Demonstrate intelligent subscription services and effect on data distribution to show reduced time for a sensor to be discovered on a network. Optimize approaches for sensor to shooter data confidence to enable validation and de-confliction of multiple target indicators. *FY 2024 Plans:* Will mature the subscription services and demonstrate scalability to multiple sensors across a disadvantaged network; improve upon performance metrics; mature and optimize approaches to de-conflict multiple target indicators; validate de-confliction approach of sensors and shooter across a network representing Multi Domain Operations (MDO). *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AQ5 *I Sensor CE-Integrated Sensor Architecture Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase reflects investments required to demonstrate the scalability and effectiveness of the services across multiple sensors, shooters, and disadvantaged networks and to optimize and validate the approaches in a MDO network.			
Accomplishments/Planned Programs Subtotals	1.585	0.625	1.955

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AQ8 *I High Tempo Data Driven Decision Tools Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AQ8: *High Tempo Data Driven Decision Tools Adv Tech*	-	2.985	6.611	3.602	-	3.602	3.783	3.924	3.927	3.970	0.000	28.802
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates data driven decision tools that help develop cyber Situational Understanding (SU) for Commanders. It enhances decision-making and accurately assesses and integrates cyber impacts with all of the domains in Multi-Domain Operations (MDO) and thereby enhances mission effectiveness by improving decision cycles.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AQ7 (High Tempo Data Driven Decision Tools Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: High Tempo Data Driven Decision Tools Advanced Technology	2.985	3.239	-
Description: This effort matures and demonstrates data driven decision tools tailored to reflect specific mission / information needs of the commander and individual staff members comprised of the following: software that facilitates the exchange of cyber data and mission information between the cyber electromagnetic activities (CEMA) cell, the S-6 and other staff officers (e.g., S-3, S-2, Fire Support Officer (FSO)), helping to assess higher-level impacts of lower-level events, and capturing the information as part of models for possible re-use; and software that dynamically populates the Common Operating Picture (COP) with visualizations designed for exploration and understanding of the impact of the cyber domain on the current mission. *FY 2023 Plans:* Develop software that connects to available and live data sources in a field environment for a soldier Collaborative Cyber Understanding demonstration. Further mature existing and new cyber data sources, cyber avenues of approach and the cyber data visualization tool based on experimentation feedback. Demonstrate that the Collaborative Cyber Understanding software dynamically updates the COP Visualizations and cyber decision models; Conduct a soldier demonstration of cyber decision model (cyber workflow/decision making process). *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AQ8 *I High Tempo Data Driven Decision Tools Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding change reflects planned lifecycle conclusion of this effort			
Title: RoadRunner Advanced Technology	-	3.237	3.602
Description: This effort matures and demonstrates stakeholder prioritized capabilities that fuse intel and ops perspectives that drive decisions to enable dominance in complex Multi-Domain Operations. *FY 2023 Plans:* Engagements with peer/near-peer and highly technical adversaries will reveal new vulnerabilities and opportunities. Using a concurrent Development, Security and Operations (DEVSECOPS) environment, develop and demonstrate optimal strategies in friendly versus enemy engagements using digitized plans and real-time decision support providing exposure to non-obvious insights, vulnerabilities, and opportunities during planning and execution phases. *FY 2024 Plans:* Will validate and provide improved strategies for friendly versus enemy engagements while reducing cognitive burden with minimal impact to time constrained force on force interactions; exploit non-obvious insights, self and adversary vulnerabilities, and tactical opportunities using real time decision support tools during planning and execution phases. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort			
Title: SBIR/STTR Transfer	-	0.135	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	2.985	6.611	3.602

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army									**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AR4 *I Intelligent Env Battlefield Awareness Adv Tech*		

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AR4: *Intelligent Env Battlefield Awareness Adv Tech*	-	3.927	-	-	-	-	-	-	-	-	0.000	3.927
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates and optimizes technologies to allow Soldiers to maneuver faster around or through existing environmental (urban/industrial) conditions and physical landscape constraints. This Project also matures and demonstrates web modules/software tools delivering crucial geo-chemical resources and advanced knowledge of geo-environmental infrastructure to mission planners.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR3 (Intelligent Environmental Battlefield Awareness).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Geo-Forensics for Reconnaissance Exploitation *Description:* This effort provides unique terrestrial patterns to describe and predict the geological, biological, and overall ecological information associated with anti-access/area denial (A2/AD) sites from the continental U.S. (CONUS) analogs.	1.247	-	-
Title: Arctic Threat Demonstrations *Description:* This effort matures and demonstrates visualization tools which enable geospatial decisions based on anticipated physical threats, hazards and dependencies posed by terrain and weather extremes in cold regions.	1.190	-	-
Title: Predictive Geographic Information System (GIS) Mapping (physical) Demonstration *Description:* This effort reduces the impact of unknown and changing terrain conditions by automating the integration of disparate datasets and overlays of terrain obstacles producing a high-fidelity map that integrates soil composition, vegetation, hydrology, and permafrost/ice data.	1.490	-	-
Accomplishments/Planned Programs Subtotals	3.927	-	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AR4 *I Intelligent Env Battlefield Awareness Adv Tech*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

 N/A

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AR6 *I Understanding the Environment as a Threat Adv Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AR6: *Understanding the Environment as a Threat Adv Tech*	-	2.432	2.767	-	-	-	1.691	-	2.017	2.523	0.000	11.430
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates tools that provide capability to inform the Solider of different routes through a complex urban landscape. Optimizes tools that balance exposure to environmental threats with mission constraints to provide a risk versus reward capability of operating in different areas of the urban theater. This Project matures and demonstrates predictive software accurately integrating the risks of physical, chemical, and biological threats in an urban environment into route planning tools.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR5 (Understanding the Environment as a Threat Technolo).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Environmental Threat Technology Demonstrations for route planning	1.240	1.008	-
Description: This effort matures and demonstrates a software tool that informs and balances the risk of exposure to environmental threats with maneuver constraints along potential routes. The software integrates the risks associated with different environmental matrices in complex urban environments and includes the capability for routing in off-road scenarios. *FY 2023 Plans:* Demonstrate the next-phase capability of minimally-viable weighted risk course forecasting algorithms based on sorption/degradation products in air, water and soil. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle of this effort as work transitions to PE 0603042A, C3I Advanced Technology, Project DE7 Understanding Environment as a Threat Adv Tech for maturation and demonstration.			
Title: Hazard Prediction Demonstration	1.000	1.001	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AR6 / *Understanding the Environment as a Threat Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: This effort matures and demonstrates a mission planning platform that provides Soldiers with a predictive visualization technology to identify, track and plan for industrial or commercial chemical/environmental threats in operational environments. *FY 2023 Plans:* Demonstrate next-phase capability based on review and critiques of minimally-viable hazard prediction models of TIC/Ms in air, water, and soil in denied urban terrain. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle of this effort as work transitions to PE 0603042A, C3I Advanced Technology, Project DE7 Understanding Environment as a Threat Adv Tech for maturation and demonstration.			
Title: Subsurface Forensics Demonstration *Description:* This effort matures and demonstrates sensing technologies for TIC/Ms to detect illicit activities with authentic wastewater treatment influent. *FY 2023 Plans:* Demonstrate sensor communication systems through sewer structures to determine minimal autonomous viable robotic platform for sensor suite. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle of this effort as work transitions to PE 0603042A, C3I Advanced Technology, Project DE7 Understanding Environment as a Threat Adv Tech for maturation and demonstration.	0.192	0.700	-
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.058	-
Accomplishments/Planned Programs Subtotals	2.432	2.767	-

C. Other Program Funding Summary ($ in Millions)
N/A

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AR6 *I Understanding the Environment as a Threat Adv Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks
 N/A

D. Acquisition Strategy
 N/A

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Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AR8 *I Sensing in Contested Environments Adv Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AR8: *Sensing in Contested Environments Adv Tech*	-	1.552	-	-	-	-	-	-	-	-	0.000	1.552
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced sensor technologies that characterize hazards posed to warfighters by non-weaponized biological hazards in subterranean environments. The Project will demonstrate adaptive commercial off the shelf sensor technologies on existing unmanned ground vehicles (UGV) platforms to gather end-user feedback.

Work in this Project complements PE 0602146A (Network C3I Technology) / Project AR7 (Sensing in Contested Environments Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Non-Traditional Threat Detection Advance Technology	1.552	-	-
Description: This effort matures and demonstrates combined commercial off the shelf capabilities from multiple sources as an integrated robotic-operable expeditionary kit for accurate detection of biological hazards for early warning in subterranean environments from point of ingress/egress prior to exposure.			
Accomplishments/Planned Programs Subtotals	1.552	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks
N/A

D. Acquisition Strategy
N/A

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2040 I 3 | | | | **R-1 Program Element (Number/Name)**
PE 0603463A I *Network C3I Advanced Technology* | | | | **Project (Number/Name)**
AS9 I *Persistent Geophysical Sensing-Infrasound Adv Tech* | | | |

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AS9: *Persistent Geophysical Sensing-Infrasound Adv Tech*	-	2.359	-	-	-	-	-	-	-	-	0.000	2.359
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates kitted hardware and software solutions that persistently monitor (through non-line-of-sight sensing including infrasound) critical infrastructure conditions and threat activities in dynamic battlefields. These technologies provide near real time data collection, processing, and alerts of infrastructure go/no-go condition required for maneuver planning. This Project also matures and demonstrates methodologies to assign maneuver relevant engineering attributes to geospatial feature data such as bridge load classification, road condition, and bathymetry.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR9 (Persistent Geophysical Sensing-Infrasound Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Battlefield Intelligence by Geophysical Sensing (BIGS) Demonstration	2.359	-	-
Description: This effort matures and demonstrates geophysical and geo-sensing technologies to persistently assess battlefield elements to include infrastructure (algorithm refinements) and additional sources of interest, such as explosive and fires events and various threats. Optimization of the array sensors and geometry to improve array performance for new sources of interest while reducing logistics will also be matured and demonstrated. New detection and classification signal processing algorithms will be validated throughout the life of the task in a phased demonstration schedule.			
Accomplishments/Planned Programs Subtotals	2.359	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AS9 *I Persistent Geophysical Sensing-Infrasound Adv Tech*

D. Acquisition Strategy
 N/A

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Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*					**Project (Number/Name)** AT3 *I Subterranean Detection and Monitoring Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AT3: *Subterranean Detection and Monitoring Adv Tech*	-	2.136	-	-	-	-	-	-	-	-	0.000	2.136
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project validates and demonstrates advanced subterranean monitoring and vulnerability assessment technologies providing mobile and man-portable solutions to enhance survivability and threat awareness during urban operations and negate enemy subterranean operation advantage. This Project also optimizes and demonstrates enhanced technologies to detect tunnels and tunneling activity in complex and varied environments.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AT2 (Subterranean Detection and Monitoring Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Subterranean Threat Assessment by Real-time Sensing Demonstrations **Description:** This effort validates and demonstrates integrated suite of tunnel detection and persistent surveillance technologies, mobile and man-portable solutions to detect underground municipal infrastructure, voids, and other subterranean vulnerabilities in urban and complex domains.	2.136	-	-
Accomplishments/Planned Programs Subtotals	2.136	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks
N/A

D. Acquisition Strategy
N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*			**Project (Number/Name)** AT8 I *Network-Enabled GeoSpatial-GEOINT Services AdvTech*				
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AT8: *Network-Enabled GeoSpatial-GEOINT Services AdvTech*	-	2.947	4.603	4.760	-	4.760	4.201	5.451	6.188	4.576	0.000	32.726
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project accelerates and exploits the tactical value of emerging field generated, mission relevant 3-dimensional (3D) geospatial data supporting mission planning, mission rehearsal and tactical situational awareness. Integrates and demonstrates the geo-registration, feature extraction, change detection, data visualization and transmission capabilities developed in the applied research portion of this Project. Tools developed for the exploitation of 3D datasets will be integrated into a streamlined workflow requiring low levels of expertise, putting advanced processing capabilities in the hands of the Soldier. This Project also includes demonstrations of tactical enhancements and the integrated ability to rapidly share mission critical 3D information in support of planning and execution.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AT7 (Network-Enabled GeoSpatial and GEOINT Services Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.
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B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: 3D Terrain Automated Geospatial Co-Registration and Change Detection *Description:* This effort matures, integrates and demonstrates the design and formulation of new urban terrain data models, frameworks and processes to automate the transformation of tactical unit generated source data (e.g. Light Detection and Ranging (LiDAR), imagery, and full motion video derived data) to new model constructs for rapid and accurate geo-registration of features (manmade infrastructure). *FY 2023 Plans:* Demonstrate advanced change detection algorithms achieving on average less than 10% of errors in matching varied data sources to achieve standard and shareable geospatial foundation data. Demonstrate 2.5D and 3D data co-registration software in	2.947	2.703	-

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Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*	**Project (Number/Name)** AT8 I *Network-Enabled GeoSpatial-GEOINT Services AdvTech*		

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
a relevant implementation environment for real-time processing, analytics, dissemination of tactical field collections to archived 3D geospatial data. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned lifecycle completion of this effort and transition of technologies.			
Title: Optimization of Geospatial Data for Tactical Visualization-Demonstration ***Description:*** This effort matures and demonstrates new open source software, data models and processes to generate a vision based geospatial foundation layer to enable end-users systems to visualize real-time mission critical geospatial content at the required level-of-detail (LOD) and enable position-navigation self-localization capability applicable to end-user devices at required accuracies optimized for the device, application, and mission. ***FY 2023 Plans:*** Mature and demonstrate delivery of optimized 3D geospatial data for visualization on end-user-devices. Demonstrate Position Navigation (PN) solutions extracted from field generated sources and delivered on to handheld devices through auto-generation of Level-of-Detail (LOD) 3D data. ***FY 2024 Plans:*** Will demonstrate advanced delivery of vision-based Position Navigation (PN) self localization from optimized geospatial data on end user devices at required accuracies. Will demonstrate reduced network bandwidth requirements though implementation of 3D Level-of-Detail (LOD) architectures and provide rigorous Figure of Merit assessment for integration to vision-based position/navigation methods. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects the planned lifecycle of this effort.	-	1.798	1.838
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.102	-
Title: Geospatial - Intelligence Community Merge Demonstration	-	-	2.138

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Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AT8 *I Network-Enabled GeoSpatial-GEOINT Services AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort matures an approach to automatically search Intelligence Community (IC) databases to discover and extract relevant attributes to be added as new metadata to adaptively scaled 3D terrain features and/or geographic areas. Geospatial and relevant intelligence data will be merged together, discoverable, and capable of user-selected query from a single computing environment. An enhanced 3D common operating picture will be demonstrated. *FY 2024 Plans:* Will advance Application Programming Interface (API) connectivity to relevant selected Intelligence Community (IC) databases to complement and enrich 3D terrain by extracting relevant attributed added as new metadata to adaptively scaled 3D terrain features and/or geographic areas. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle initiation of this effort.			
Title: Geospatially Relevant Intuitive Propagation Services for Complex Environments Demonstration *Description:* This effort matures and demonstrates a novel expert propagation framework for assessing sensor performance in complex terrain, with integrated battlefield sensor data and environmental predictive modeling (weather and terrain influences) into intuitive displays for analysts, planners, and collection managers. *FY 2024 Plans:* Will advance use cases within the Common Operating Environment to enable an automated and integrated system to predict and visualize sensor performance caused by environmental conditions effects. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle initiation of this effort.	-	-	0.784
Accomplishments/Planned Programs Subtotals	2.947	4.603	4.760

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks
 N/A

D. Acquisition Strategy
 N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AU1 *I Tactical GeoSpatial Information Capabilities ATech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AU1: *Tactical GeoSpatial Information Capabilities ATech*	-	4.053	5.996	2.112	-	2.112	2.717	4.476	7.674	4.713	0.000	31.741
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates next generation geospatial analytical tools for three-dimensional (3D) complex environments applicable to low echelon and tactical edge exploitation. These new capabilities will allow deployed units to enhance/update provisioned (baseline) standard, sharable, geospatial foundation (SSGF) data through automated analytics on multi-sourced spatial data resulting in streamlined, high fidelity terrain analysis products. Reducing data gaps and processing timelines will greatly increase Soldier situational awareness and support faster decision making in complex terrain.

Work in this Project complements Program Element (PE) 0602146A Network C3I Technology / Project AT9 (Tactical GeoSpatial Information Capabilities Techn).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: 3D Terrain Analysis	2.220	3.819	-
Description: This effort integrates and demonstrates software models and workflows provisioned on the geospatial and GEOINT workstations for improved capabilities to generate, process and exploit terrain products enabling situational awareness and rapid decision making at the tactical edge. **FY 2023 Plans:** Demonstrate mature enhanced terrain processing and feature layer generation tools for Program Manager (PM) Intelligence Systems and Analytics (IS&A) (formerly DCGS-A), providing high resolution, highly accurate feature information to support situational awareness, actionable maneuver and force protection in highly dynamic operational environments. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding decrease reflects the planned lifecycle conclusion of this effort and transition of technologies.			
Title: Previously Advanced Airborne Light Detection and Ranging (LIDAR)	1.833	2.050	-
Description: This effort integrates and demonstrates enhanced Geiger-mode LiDAR hardware/software, for advanced testing of protocols, equipment, and products for enhanced high-altitude/wide area terrain data collection, to support tactical operations.			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AU1 *I Tactical GeoSpatial Information Capabilities ATech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Demonstrate integrated system of hardware components with system-specific calibration and optimized signal processing to inform system requirements enabling long-standoff airborne 3D remote sensing. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle conclusion of this effort with a supporting insertion to the United States Army Combat Capabilities Development Command, C5ISR Center.			
Title: SBIR/STTR Transfer	-	0.127	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: Geospatial Analytics and Prediction Demonstration	-	-	2.112
Description: This effort integrates and demonstrates automated/semi-automated geospatial tools implementing spatial/temporal data analysis, creation of predictive scenarios, anomaly detection and cross-scale and local-scale analysis of terrain. *FY 2024 Plans:* Will advance high-resolution 3D building-scale mapping workflow including interiors, exteriors and surrounding urban terrain. Will initiate designs for preliminary software tools for spatial, temporal and cross-scale analysis of terrain. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle initiation of this effort.			
Accomplishments/Planned Programs Subtotals	4.053	5.996	2.112

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AU1 *I Tactical GeoSpatial Information Capabilities ATech*
D. Acquisition Strategy N/A		

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AU2 *I Optimization of Geospatial Data for Visualization*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AU2: *Optimization of Geospatial Data for Visualization*	-	2.092	-	-	-	-	-	-	-	-	0.000	2.092
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates new open source software defined data models, and establishes an architecture to provide correct (mission context) geospatial content to the end-user consistent with device, tactical assessment/need, available bandwidth, and user movement. Advanced software and processes will reduce file size and network requirements, enabling near real-time updates to Soldiers. Resulting three-dimension 3D foundation data and associated accuracy information will enable position and navigation determination, through analysis with a variety of Soldier and vehicle borne sensors.

Work in this Project complements PE 0602146A (Network C3I Technology) / Project AT7 (Network-Enabled GeoSpatial-GEOINT Services Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Optimization of Geospatial Data for Tactical Visualization-Demonstration	2.092	-	-
Description: This effort matures and demonstrates new open source software, data models and processes to generate a vision-based geospatial foundation layer to enable end-users systems to visualize real-time mission critical geospatial content at the required level-of-detail (LOD) and enable position-navigation self-localization capability applicable to end-user devices at required accuracies optimized for the device, application, and mission.			
Accomplishments/Planned Programs Subtotals	2.092	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks
N/A

D. Acquisition Strategy
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603463A I *Network C3I Advanced Technology*						Project (Number/Name) AU4 I *Geospatially Enabled Operational Design Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AU4: *Geospatially Enabled Operational Design Adv Tech*	-	7.665	12.197	10.953	-	10.953	10.791	5.123	6.422	8.178	0.000	61.329
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates, integrates and transitions to the Army Command Post Computing Environment, a geospatially enabled collaborative planning environment, accessible across echelons, with capabilities that support Army Design Methodology (ADM) by providing the ability to perform conceptual planning and problem framing, supporting a greater understanding and visualization of the dynamic operational environment, a shared understanding of the operations purpose across echelons, and enhanced products to drive detailed budget planning and operational assessment processes, enhancing the collaborative interaction between commanders, staffs, and unified action partners.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AU3 (Geospatially Enabled Operational Design Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Geospatially Operational Design (GEOD) - Demonstration	7.665	5.076	-
Description: This effort integrates and demonstrates automation technologies to digitally visualize, create and assess critical elements of the Operational Environment required to inform the Operational Design functions, including collaborative conceptual framing of the problem. **FY 2023 Plans:** Demonstrate and transition a set of advanced strategic and operational planning tools to support ADM, and digitally create, visualize, assess, and brief the design framework, critical elements, and their interrelationships inside the Operational Environment in geospatial and geopolitical context. Will be transitioned to the Command Post Computing Environment (CPCE) Program of Record. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding decrease reflects the planned lifecycle conclusion of this effort with a Technical Readiness Level (TRL) 6 demonstration and transition of capabilities.			
Title: Integration of intel and logistics Multi Echelon Planning	-	4.035	3.109

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AU4 *I Geospatially Enabled Operational Design Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort demonstrates a suite of analytical and visualization tools designed to facilitate analysis of multiple courses of action through modeling and simulation (M&S) and wargames to support development of alternate Courses of Action (COAs) and approval of the operational plan. *FY 2023 Plans:* Integrate and demonstrate an advanced suite of automated tools to facilitate development of COAs, to include initial assessments of their viability and set up of wargames and M&S that support further analysis. *FY 2024 Plans:* Will demonstrate advanced suite of analytical and visualization tools to facilitate Courses of Action (COA) analysis through modeling and simulation (M&S) and wargames to improve coordination and increase efficiencies in the Military Decision Making Process (MDMP). *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle of this effort completing in Fiscal Year 2024.			
Title: Automated intelligence Preparation of the Battlefield (IPB) Demonstrations *Description:* This effort develops and demonstrates a collaborative, adaptive planning capability that allows planners to employ resources leveraging geospatial, terrain, environmental effects, and authoritative data from distributed information databases in order to collaborate in the development and assessment of courses of action, visualize potential outcomes, make decisions and develop and disseminate plans and orders. *FY 2023 Plans:* Develop and demonstrate advanced capabilities for multi-domain visualization of IPB products, and automates integration of those products into the military planning process. *FY 2024 Plans:* Will demonstrate analytical tools within Joint Planning Services (JPS) platform for the generation of digestible Intelligence Preparation of the Battlefield (IPB) information to increase understanding of operational environment and threats in support of the military planning process. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects the planned lifecycle of this effort.	-	3.075	3.160
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638	-	0.011	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AU4 *I Geospatially Enabled Operational Design Adv Tech*		

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Title: GEOInt Ops Integration of tactical operational and strategic orders	-	-	4.684
Description: This effort will demonstrate a suite of automated tools designed to facilitate rapid and efficient dissemination of orders and real-time visibility of subordinate planning as it relates to key tasks from higher echelons and desired end state down to Battalion. *FY 2024 Plans:* Will demonstrate through agile design reviews with Program of Record automated tools within Joint Planning Services (JPS) platform to allow rapid creation and dissemination of digital orders and reduce cognitive burden and gain efficiencies in the military planning process. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle initiation of this effort.			
Accomplishments/Planned Programs Subtotals	7.665	12.197	10.953

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** AV1 *I GEOInt/Ops Logistics Integration-Planning Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AV1: *GEOInt/Ops Logistics Integration-Planning Adv Tech*	-	3.726	-	-	-	-	-	-	-	-	0.000	3.726
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a suite of analytical and visualization tools designed to facilitate analysis of courses of action (COAs) through modeling and simulation (M&S) and wargames to support development of alternate COAs and approval of the operational plan (OPLAN). This Project will integrate existing M&S and wargaming applications (One Semi-Automated Forces; Infantry Warrior Simulation ; Logistics Composite Model), to assess multiple courses of action to be analyzed in a multi-domain environment.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	FY 2023	FY 2024
Title: Integration of intel and logistics Multi Echelon Planning *Description:* This effort demonstrates a suite of analytical and visualization tools designed to facilitate analysis of multiple courses of action through M&S and wargames to support development of alternate COAs and approval of the operational plan.	3.726	-	-
Accomplishments/Planned Programs Subtotals	3.726	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks
N/A

D. Acquisition Strategy
N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*					**Project (Number/Name)** AV4 I *Foundational S&T for Network C3I Advanced Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AV4: *Foundational S&T for Network C3I Advanced Tech*	-	7.468	0.851	-	-	-	-	-	-	-	0.000	8.319
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 In Fiscal Year (FY) 2024 this Project is terminated.

A. Mission Description and Budget Item Justification
 This Project matures and demonstrates underlying technologies applicable to artificial intelligent agents and holistic network integration as applied to, but not limited to autonomous manned-unmanned teaming for ground and air platforms. This Project also matures and demonstrates emerging research leading to potential technology development in areas of strategic importance to the Army in network technologies, by bringing competitively selected Universities with research teams into Technical Alliances.

 This work complements Program Element (PE) 0602146A (Network C3I Technology) / Project AV3 (Foundational S&T for Network C3I Technology).

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

 Work in this Project is performed by the Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Demonstration of Disruptive, Innovative Research for Emerging (DIRE) Advanced Network Capabilities *Description:* This effort demonstrates innovative network capabilities using a rapid and agile methodology to evaluate the feasibility of incorporation into Army network problem sets. *FY 2023 Plans:* Completing innovative technology pilot for experimenting and demonstrating innovative and disruptive network capabilities in the space of network resiliency, artificial intelligence, and autonomy. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease to support Army high priority effort for agile acceleration of Directed Energy in the Air and Missile Defense Advanced Technology (0603466A) Project CV6.	7.468	0.820	-
Title: SBIR/STTR Transfer	-	0.031	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Tec hnology*	**Project (Number/Name)** AV4 *I Foundational S&T for Network C3I Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decreased in accordance transfer complying with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	7.468	0.851	-

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603463A I Network C3I Advanced Technology					Project (Number/Name) AV8 I Navigation Warfare (NAVWAR) Advanced Technology		
COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AV8: Navigation Warfare (NAVWAR) Advanced Technology	-	1.856	1.949	6.029	-	6.029	3.980	6.024	-	3.465	0.000	23.303
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates capabilities allowing the Army to monitor, understand, and control the Navigation Warfare (NAVWAR) environment. This requires an integrated approach to Electronic Protection (EP), Electronic Support (ES), and Electronic Attack (EA) to rapidly characterize the NAVWAR environment, deny Positioning, Navigation, and Timing (PNT) based capabilities to our adversaries, and maintain Army capabilities.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AW1 (Autonomous Navigation Technology) complements this Project.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: PNT Situational Awareness (SA) Advanced Technology	1.856	1.949	-
Description: This effort demonstrates real time PNT Situational Awareness for a Common Operating Picture (COP) on selected Computing Environment (CE); improves fusion algorithms for at least two types of PNT SA sensors (terrestrial, air, space); generates an Interface Control Document (ICD) for PNT SA messages; allow open integration and reference implementation for PNT SA stored data for distribution on various platforms. **FY 2023 Plans:** Mature and validate integration of aerial sensor data into data fusion software and demonstrate an integrated system of systems approach at a field demonstration. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding decrease reflects planned lifecycle conclusion of this effort			
Title: Intelligent Electronic Protect (IEP) Advanced Technology	-	-	6.029

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AV8 / *Navigation Warfare (NAVWAR) Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: This effort matures and demonstrates hardware and software capabilities that will enable an Assured Position Navigation and Timing (APNT) system to function as a Navigation Warfare (NAVWAR) sensor. The IEP enabled APNT system will be able to detect and identify information about jamming and spoofing threats in the Global Positioning System (GPS) environment, protecting units from spoofing and increasing the number and availability of NAVWAR sensors in the field. The proliferation of NAVWAR sensors allows Electronic Warfare Planning and Management Tool (EWPMT) to create a NAVWAR Common Operating Picture with greater accuracy and coverage, allowing Commanders to make more informed decisions about maneuver and allowing for more accurate and successful fires missions. *FY 2024 Plans:* Will mature machine learning (ML) techniques to enable detection and classification capabilities in an IEP enabled APNT system for use on ground vehicle platforms; exploit the machine learning techniques to allow use of existing GPS receiver hardware as a NAVWAR sensor; optimize artificial intelligence (AI)/ML techniques to understand the changes in the environment and utilize appropriate modes to counter interference events; mature the APNT system (hardware and software) to exploit this new NAVWAR data to improve overall anti-spoof protection; demonstrate initial machine learning techniques and hardware improvements at end of FY24 field test event. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle initiation of this effort.			
Accomplishments/Planned Programs Subtotals	1.856	1.949	6.029

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*					**Project (Number/Name)** AW6 *I Modular GPS Independent Sensors Advanced Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AW6: *Modular GPS Independent Sensors Advanced Tech*	-	6.542	10.131	12.343	-	12.343	14.732	6.459	12.491	4.784	0.000	67.482
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a resilient, soldier-integrated precision navigation and timing solution, providing precision geolocation, geospatial survey information, global positioning system (GPS) spoofing awareness and countermeasures to dismounted warfighters in GPS-denied/degraded environments.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AW1 (Autonomous Navigation Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Soldier-Integrated Positioning, Navigation, and Timing (PNT) **Description:** This effort implements a standards-based, open PNT architecture solution for rapid commercial of the shelf (COTS) and emerging technology integration; incorporates artificial intelligence approaches to aggregate multiple organic and networked sensor inputs for improved PNT accuracy and reliability; demonstrates Simultaneous Localization and Mapping (SLAM) based-algorithms incorporating alternative PNT inputs; and demonstrates alternative PNT sensors and approaches, including radio frequency time differencing, signals of opportunity, inertial, gravimetric, and imagery. **FY 2023 Plans:** Exploit and provide technology discovery for network ranging, flexible and modular Radio Frequency (RF) antenna designs. Execute demonstrations and soldier touch points with anti-jam technologies. Finalize fabrication and packaging. **FY 2024 Plans:** Will continue to exploit and provide technology discovery for network ranging, flexible and modular Radio Frequency (RF) antenna designs. Will incorporate artificial intelligence approaches and will mature alternate PNT sensors to improve PNT accuracy and reliability. **FY 2023 to FY 2024 Increase/Decrease Statement:**	6.542	2.476	3.003

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** AW6 *I Modular GPS Independent Sensors Advanced Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding increase reflects maturation activities of artificial intelligence approaches and alternate PNT sensors.			
Title: Soldier Integrated Positioning Navigation and Timing - Modular Architecture & Integrated Demonstrators	-	7.655	9.340
Description: This effort optimizes, improves, and demonstrates the modular architecture for PNT capabilities; matures and integrates alternative PNT sensors and approaches, including radio frequency time differencing, signals of opportunity, inertial, gravimetric, and imagery; matures, integrates, demonstrates and validates a final Modular Handheld; integrates and demonstrates PNT technologies with Soldier interface systems. *FY 2023 Plans:* Optimize and validate the Initial Modular Handheld and PNT technologies, including the PNT open architecture; optimize and validate sensor integration for new PNT algorithms, anti-jam capability, vision aided navigation, network ranging and other alternate navigation technologies. Fabricate and demonstrate PNT open architecture, PNT technologies and validated sensors in SWAP optimized integrated demonstrator. Execute soldier touch points with the integrated demonstrator. *FY 2024 Plans:* Will integrate PNT sensors, algorithms, anti-jam capabilities, vision aided navigation, network ranging and other alternative navigation technologies with existing Soldier-borne device and demonstrate capability at a Soldier touch-point in a relevant environment; assess performance and mature interfaces and messaging necessary to distribute accurate position and timing across wirelessly connected Soldier-borne devices; integrate low-cost timing technologies into a modular open systems architecture Soldier Integrated technology demonstrator. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects maturation of additional alternative PNT sources and integration of components in advance of field test for component validation and demonstration in relevant environment.			
Accomplishments/Planned Programs Subtotals	6.542	10.131	12.343

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** BP4 *I ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*				

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*	-	55.500	52.500	-	-	-	-	-	-	-	0.000	108.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

 Congressional Interest Item funding provided for Electronic Warfare Advanced Technologies.

A. Mission Description and Budget Item Justification

 Congressional Interest Item funding provided for Electronic Warfare Advanced Technologies.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Program Increase - Assured Position, Navigation, and Timing Technology	4.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for APNT Technology		
FY 2023 Plans: Congressional Interest Item funding provided for APNT Technology		
Congressional Add: Program Increase - Advanced Materials for Resilient Sensors	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Advanced Materials for Resilient Sensors		
Congressional Add: Program Increase - Tactical Geospatial Information Capabilities	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Tactical Geospatial Information Capabilities		
Congressional Add: Program Increase - Alternative Navigation for GPS-Denied Landing Environments	4.500	4.500

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** BP4 *I ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Alternative Navigation for GPS-Denied Landing Environments ***FY 2023 Plans:*** Congressional Interest Item funding provided for Alternative Navigation for GPS-Denied Landing Environments		
Congressional Add: Edge-High Performance Computing for Multi-Domain Operations ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Edge-High Performance Computing for Multi-Domain Operations	5.000	-
Congressional Add: HALITE ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for HALITE	7.000	-
Congressional Add: Program Increase - Next Generation Command Posts ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Next Generation Command Posts ***FY 2023 Plans:*** Congressional Interest Item funding provided for Next Generation Command Posts	10.000	7.000
Congressional Add: Receiver-Sensor Technology for Tactical Networks ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Receiver-Sensor Technology for Tactical Networks	15.000	-
Congressional Add: Program Increase - ADVANCE MATERIALS FOR COMMAND POST OF THE FUTURE ***FY 2023 Plans:*** Congressional Interest Item funding provided for ADVANCE MATERIALS FOR COMMAND POST OF THE FUTURE	-	1.500
Congressional Add: Program Increase - ADVANCED PRECISION, NAVIGATION AND TIMING FOR LANDING ENVIRONMENTS ***FY 2023 Plans:*** Congressional Interest Item funding provided for ADVANCED PRECISION, NAVIGATION AND TIMING FOR LANDING ENVIRONMENTS	-	2.500
Congressional Add: Program Increase - HUMAN GEOGRAPHY REPOSITORY FOR COMMERCIAL CIVIL AFFAIRS ***FY 2023 Plans:*** Congressional Interest Item funding provided for HUMAN GEOGRAPHY REPOSITORY FOR COMMERCIAL CIVIL AFFAIRS	-	5.000
Congressional Add: Program Increase - MULTI-PLATFORM RECEIVER-SENSOR TECHNOLOGY	-	20.000

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** BP4 *I ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2023 Plans: Congressional Interest Item funding provided for MULTI-PLATFORM RECEIVER-SENSOR TECHNOLOGY		
Congressional Add: Program Increase - SMALL SATELLITE HIGH ALTITUDE LAUNCH, INTEGRATION, TEST, AND EVALUATION	-	7.000
FY 2023 Plans: Congressional Interest Item funding provided for SMALL SATELLITE HIGH ALTITUDE LAUNCH, INTEGRATION, TEST, AND EVALUATION		
Congressional Adds Subtotals	55.500	52.500

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army								**Date:** March 2023			
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*				**Project (Number/Name)** CF9 *I Automated IPB Adv Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CF9: *Automated IPB Adv Tech*	-	0.953	-	-	-	-	-	-	-	-	0.000	0.953
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate advanced algorithms for multi-domain visualization of explicit and implicit relationships between the populace and the theater environment. Capabilities resulting from this effort will directly and substantially support Army and Joint Global Integration Planning requirements, provide a globally accessible web based digital intelligence preparation of the battlefield (IPB) platform supporting collaborative product development, and help facilitate a shared understanding of the operational environment. Automated IPB provides an integrated Intelligence Community planning data platform for Joint Global Integration Planning requirements.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Automated IPB Demonstrations	0.953	-	-
Description: This effort develops and demonstrates a collaborative, adaptive planning capability that allows planners to employ resources leveraging geospatial, terrain, environmental effects, and authoritative data from distributed information databases in order to collaborate in the development and assessment of courses of action, visualize potential outcomes, make decisions and develop and disseminate plans and orders.			
Accomplishments/Planned Programs Subtotals	0.953	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks
N/A

D. Acquisition Strategy
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*					**Project (Number/Name)** CI7 *I Mobile & Survivable Command Post (MASCP) Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CI7: *Mobile & Survivable Command Post (MASCP) Adv Tech*	-	7.524	13.119	18.691	-	18.691	16.424	19.857	19.871	20.087	0.000	115.573
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project matures and demonstrates technologies to support scalable, survivable, mobile Command Posts (CP). Technologies addressed will use the Brigade CP as a baseline while providing the opportunity for solutions to scale up or down to Army tactical echelons. Research in this Project includes integrating anti-jam (AJ) and low probability of intercept (LPI)/low probability of detection (LPD) communications focused on enabling the CP to disperse, form & reform, and employ technologies for signal remoting; optimizing power generation and storage for distributed CP operations; reducing computing infrastructure footprint, size, weight, and power (SWAP), manpower, and complexity; maturing technologies to reduce CP emissions and have situational awareness of those signatures to improve CP node employment; maturing electro-magnetic spectrum (EMS) emulation technologies to improve survivability options; and optimizing emerging electronic-textiles and composite materials for CP structures.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project CI3 (Mobile and Survivable Command Post (MASCP) Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: CP Modularity and Dispersion Advanced Technology	3.350	2.331	9.741
Description: Increases the ability for Commanders to move and disperse the CP through improved intra-CP communications, modular CP hardware to include distributed power systems, and network solutions leveraging open systems architectures to support information flow in distributed, intermittent, and latent (DIL) environments. This effort will eliminate centralized points of failure and critical nodes that constrain CP mobility and survivability. Areas of technology development include be distributed tactical cloud architecture, mesh network security architecture, high performance computing, integrated power, and distributed collaborative technologies. *FY 2023 Plans:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603463A I *Network C3I Advanced Technology*	**Project (Number/Name)** CI7 I *Mobile & Survivable Command Post (MASCP) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Begin demonstrations of a wireless antenna remoting capability and Command Post specific communications systems that are effective with Dispersed Command Post configurations; demonstrate initial capabilities for dispersed collaboration; mature the vehicle mounted power systems using open standard interfaces to accurately measure and respond to changing power demands of dispersed command post operations. *FY 2024 Plans:* Will continue demonstration of wireless antenna remoting capability, specifically for Internet Protocol (IP) and legacy radio systems; optimize modulation and de-modulation performance of antenna remoting for both legacy and IP systems; mature and demonstrate advanced directional communications transport for congested and contested environments, improving anti-jam and low probability of detection of the dispersed command post; improve performance of dispersed collaboration for multi-node command post operations; improve the performance of vehicle mounted power systems and control mechanisms to provide efficient electrical power for dispersed command post operations; exploit Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Electronic Warfare (EW) Open Suite of Standards (CMOSS) capable systems for compatibility and to reduce size, weight, and power. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects increase in scope of wireless antenna remoting capabilities to include both IP and non-IP legacy systems.			
Title: Signature Management and Reduction Advanced Technology *Description:* Provides advanced technologies to reduce and manage electromagnetic spectrum signatures of CP platforms and command post components. *FY 2023 Plans:* Demonstrate initial proof-of-concept hardware and software to provide real time situational awareness of Command Post radio frequency emissions; demonstrate solutions to decrease CP signature in ultraviolet, visible, thermal, infrared, radar, and radio frequency spectra. *FY 2024 Plans:* Will improve real-time spectrum situation awareness of radio frequency emissions at each command post node; optimize coordination of collected spectrum emissions from each command post node during dispersed operations to validate spectrum operating picture; improve software application performance across multiple command post nodes providing situational awareness of CP emission status. *FY 2023 to FY 2024 Increase/Decrease Statement:*	0.392	6.693	5.068

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** CI7 *I Mobile & Survivable Command Post (MASCP) Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding decrease reflects decreased scope for the development of CP centric sensors			
Title: Advanced Technology Supporting Camouflage, Concealment, and Deception	3.782	3.789	3.882
Description: This effort demonstrates innovative camouflage, concealment and deception technologies, for expeditionary assets (i.e. mission command platforms, battle management centers and supporting equipment), in order to defeat advanced and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats, and to reduce the probability of detection in multi-domain operations. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment. *FY 2023 Plans:* Validate and verify ability to address signature management performance in a relevant environment; demonstrate deployable command post solutions on targeted mobile platforms; perform analysis of sensor demonstration data to inform command post situational awareness; demonstrate increased survivability for multi-domain operations. *FY 2024 Plans:* Will demonstrate large format advanced camouflage solutions to include material and deployment solutions to conceal high value assets form detection against peer threats and a LiDAR detection capability; validate and verify ability to address signature management performance in a relevant environment. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.306	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	7.524	13.119	18.691

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** CI7 *I Mobile & Survivable Command Post (MASCP) Adv Tech*

D. Acquisition Strategy
  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603463A / Network C3I Advanced Technology				**Project (Number/Name)** CJ8 / Assured PNT Communications Advanced Tech			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CJ8: *Assured PNT Communications Advanced Tech*	-	16.036	11.128	11.783	-	11.783	13.411	14.052	14.141	14.296	0.000	94.847
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will provide prototyping, development, and experimentation of High Altitude (HA) sensors and Tactical Space Layer (TSL) sensors (electro-optical, synthetic aperture radar (SAR), and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. This Project matures, demonstrates, and integrates lightweight materials, hardware components with reduced power consumption, and advanced data collection, processing, and dissemination capabilities. This Project also improves algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems. The payoff of this work will be demonstrated advanced technologies for Alternative Navigation assistance and more secure, rapid communications along with deep target sensing for deep strike lethality. Demonstrated work will be ready for transition to advanced prototypes.

Work in this project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects CK1 (Assured PNT Enabling Technologies) and Project CG3 (Assured PNT Communications Applied Research).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Space and Missile Defense Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology *Description:* This effort matures and demonstrates technologies required for smaller, more responsive and direct access to space and HA deep-sensing sensors and tactical communication capabilities for soldiers at the tactical edge. Research will augment, improve, exploit, and optimize existing commercial and Department of Defense (DoD) technologies and networks. This effort will validate software, hardware, and algorithms used to enable Space-Based and HA platform based capabilities in support of the Army's Modernization Priorities. This effort will exploit commercial advances and opportunities in integrating Space/HA sensors or Deep Sensing capabilities and payload management toward future Army concepts. Develop/demonstrate critical technical elements for a LEO-based global high-speed network backbone enabling highly networked, resilient, and persistent DoD payloads to provide over the horizon sensing, signals, and communication, with continuous surveillance of ground, surface, and air domains.	16.036	10.933	11.783

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** CJ8 *I Assured PNT Communications Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY 2023 Plans: Will develop and demonstrate small satellite capabilities, which include classified payloads, to provide APNT services to the tactical ground component Warfighters; exploit a constellation of space-based sensors that provide Tactical ISR (Intelligence, Surveillance, and Reconnaissance) and Situational Awareness (SA) to the ground force commander to support MDO; develop and demonstrate optical communications using classical and Quantum Entanglement (QE) technologies; develop and demonstrate QE including site-to-site communications from a small satellite in Space, High Altitude platform, or ground based/launched platform; and mature the QE technology and demonstrate optical and quantum signals passed between small spacecraft, HA platforms, Space (or HA), and/or ground launched assets. Will complete assembly, integration, testing, and conduct a QE technology demonstration event tied to Army warfighter communications requirements. Will begin design and development of including long lead component orders of classified capabilities and high altitude platforms and associated payloads to support tactical ground component Warfighters with advanced APNT capabilities.			
FY 2024 Plans: Will develop High Altitude (HA) data communications payload with ability to communicate with Proliferated Low Earth Orbit (P-LEO) satellite constellation. Will continue toward demonstration of classified capability with preparation for military utility assessment. For Alternate Navigation capability development, will delivery payload and integrate with satellite bus.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding increase reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.195	-
Description: Funding transferred in accordance with Title 15 USC 638. *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638.			
Accomplishments/Planned Programs Subtotals	16.036	11.128	11.783

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CJ8 / *Assured PNT Communications Advanced Tech*

D. Acquisition Strategy

  N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603463A I *Network C3I Advanced Technology*						Project (Number/Name) DB6 I *Pathfinder 3D Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
DB6: *Pathfinder 3D Advanced Technology*	-	-	-	1.045	-	1.045	1.986	1.988	3.141	3.276	0.000	11.436
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Pathfinder 3D Advanced Technology is a new start within the Network C3I Advanced Technology program in FY 2024.

A. Mission Description and Budget Item Justification
 This Project matures and demonstrates a geospatial rapid position and navigation solution in Global Positioning System (GPS) degraded and denied environments. Research focuses on using onboard sensors and high-resolution digital terrain geospatial alternative solution based upon Visual Three-Dimensional (3-D) Terrain Referencing and Navigation (VTRAN). This Project will result in the linkage of air and ground assets integrating sensory and (One World Terrain and Reference) geospatial data within the modular GPS Independent Sensors architecture. This Project provides critical alternatives to maneuver forces for position and navigation in a multi-domain operational environment.

 Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project CV4 (Pathfinder 3d Applied Technology).

 The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

 Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: PATHFINDER 3D Demonstration	-	-	1.045
Description: This effort will demonstrate and integrate novel Visual Terrain Reference & Navigation (VTRAN) algorithms, onboard sensors, and 3-Dimensional digital terrain to derive position and orientation estimates and apply those to modular Position Navigation and Timing (PNT) integrators. *FY 2024 Plans:* Will demonstrate local routing capabilities, sensors and a basic inertial accuracy for Visual Terrain Reference and Navigation (VTRAN) to test integrated foundation geospatial data including One World Terrain and analogs, sensory sources (from both air and ground) to derive state estimation for a robotic semi-autonomous system. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*	**Project (Number/Name)** DB6 *I Pathfinder 3D Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
This is a New Start in FY 2024			
Accomplishments/Planned Programs Subtotals	-	-	1.045

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*						**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*						
COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	138.482	202.830	153.024	-	153.024	127.982	131.428	119.292	119.789	0.000	992.827
AE8: *Land-Based Anti-Ship Missile (LBASM) Advanced Tech*	-	15.125	12.150	-	-	-	-	-	-	-	0.000	27.275
AF2: *Long Range Maneuverable Fires (LRMF) Advanced Tech*	-	-	4.663	62.661	-	62.661	50.970	50.126	1.311	1.658	0.000	171.389
AG3: *Extended Range Cannon Artillery (ERCA) Adv Tech*	-	3.003	3.354	-	-	-	6.480	9.418	11.309	11.432	0.000	44.996
AG5: *Extended Range Artillery Munition Suite Adv Tech*	-	32.594	27.461	23.484	-	23.484	9.726	-	10.197	8.243	0.000	111.705
AG7: *Energetic Materials and Adv Processing Adv Tech*	-	2.020	1.954	-	-	-	-	-	-	-	0.000	3.974
BO8: *Long Range Precision Fires Advanced Tech (CA)*	-	48.000	102.000	-	-	-	-	-	-	-	0.000	150.000
BY2: *Advanced Hypersonic Technology*	-	37.740	36.517	64.136	-	64.136	49.592	50.808	50.835	51.633	0.000	341.261
CE9: *Armaments Advanced Technology**	-	-	-	-	-	-	8.406	10.844	12.362	13.516	0.000	45.128
CZ8: *PrSM Modular Payload Advanced Development*	-	-	14.731	2.743	-	2.743	2.808	10.232	33.278	33.307	0.000	97.099

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2024

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates Long Range Precision Fires (LRPF) technologies to destroy, neutralize, or suppress the enemy by cannon artillery and missile fire and enable integration of fire support assets into combined arms operations. Major Focus Areas for LRPF Science and Technology include: Missiles, Cannon Artillery, and Supporting LRPF Technologies covering Strategic, Operational and Tactical Lines of Effort. LRPF Missiles Advanced Development matures and demonstrates a broad range of Missile technologies to enhance Army integrated LRPF capabilities at extended range. Cannon Artillery Advanced Development matures and demonstrates critical technologies to increase range, precision, and both point and area effects for cannon artillery. Supporting LRPF Technologies Advanced Development matures and demonstrates a broad range of component technologies to address weapon cost drivers and enhance performance of future LRPF munitions and systems.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*

Research in this Program Element (PE) complements PE 0602147A Long Range Precision Fires Technology.

This PE is directly aligned to the Army Long Range Precision Fires (LRPF) Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research is performed by the United States Army Futures Command (AFC).

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	141.909	100.830	133.252	-	133.252
Current President's Budget	138.482	202.830	153.024	-	153.024
Total Adjustments	-3.427	102.000	19.772	-	19.772
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	102.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.427	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	19.772	-	19.772

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: BO8: *Long Range Precision Fires Advanced Tech (CA)*		
Congressional Add: *Program Increase - Hypervelocity Projectile Extended Range*	25.000	25.000
Congressional Add: *Extended Range Artillery Munitions Suite*	20.000	-
Congressional Add: *Program Increase - Maneuvering Submunitions for Precision Strike Missile*	3.000	9.000
Congressional Add: *Program Increase - AFT COMBUSTOR RAMJET PROPULSION*	-	10.000
Congressional Add: *Program Increase - DEVELOPMENT AND TESTING OF PROPELLANTS USING ADVANCED MANUFACTURING*	-	5.000
Congressional Add: *Program Increase - HYPERSONIC AND STRATEGIC MATERIALS AND STRUCTURES*	-	8.000
Congressional Add: *Program Increase - HYPERSONIC METAL ALLOYS*	-	2.000
Congressional Add: *Program Increase - MISSILE MULTI AGENT EXTENSIBLE ENGAGEMENT SERVICES*	-	15.000
Congressional Add: *Program Increase - SUPER RAMJET ARTILLERY MISSION*	-	8.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Congressional Add: *Program Increase - XM1155 GUIDED FLIGHT PROJECTILE*	-	20.000
Congressional Add Subtotals for Project: BO8	48.000	102.000
Congressional Add Totals for all Projects	48.000	102.000

Change Summary Explanation

Funding increase in FY24 reflects planned program development and demonstration of seeker and navigation component technologies and supports transition of thermal protection materials for the Common Hypersonic Glide Body (CHGB) and the Long Range Hypersonic Weapon system.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603464A I Long Range Precision Fires Advanced Technology							Project (Number/Name) AE8 I Land-Based Anti-Ship Missile (LBASM) Advanced Tech	
COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AE8: Land-Based Anti-Ship Missile (LBASM) Advanced Tech	-	15.125	12.150	-	-	-	-	-	-	-	0.000	27.275
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by maturing and demonstrating critical technologies to detect, engage, and defeat moving land or maritime surface targets under all conditions.

Research in this Project complements Program Element (PE) 0602147A (Long Range Precision Fires Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Land Based Anti-Ship Missile (LBASM) Advanced Technology **Description:** Matures and demonstrates technologies that enable high-mobility artillery rocket system (HIMARS) and multiple-launch rocket system (MLRS) rocket/missile artillery systems to destroy enemy air defenses in the land and the maritime domains. **FY 2023 Plans:** Will end demonstrations and data evaluation of multi-mode seeker technologies in a surrogate missile system. Will mature concepts for re-factoring multi-mode seeker technologies into PrSM form factor. Will demonstrate multi-mode seeker technologies as part of the PrSM form factor through hardware-in-the-loop to verify operation when integrated with other PrSM components. **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding change reflects conclusion of this effort	15.125	11.826	-
Title: SBIR/STTR Transfer **Description:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 Plans:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 to FY 2024 Increase/Decrease Statement:**	-	0.324	-

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AE8 *I Land-Based Anti-Ship Missile (LBASM) Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	15.125	12.150	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*					**Project (Number/Name)** AF2 *I Long Range Maneuverable Fires (LRMF) Advanced Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AF2: *Long Range Maneuverable Fires (LRMF) Advanced Tech*	-	-	4.663	62.661	-	62.661	50.970	50.126	1.311	1.658	0.000	171.389
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by developing, maturing and demonstrating next generation Multi-Domain Operations extended range weapon system technology for Precision Strike Missile to increase survivability, penetration, and range in complex Anti Access/Area Denial (A2/AD) and denied environments. This Project also includes both the maturation and demonstration of advanced extended range missile technology and autonomous, unmanned launcher technology. The combination of these technologies offers the potential to dramatically increase force projection through increases in range, firepower, and magazine depth.

Research in this Project complements Program Element (PE) 0602147A (Long Range Precision Fires Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Long Range Maneuverable Fires (LRMF) Advanced Tech	-	4.493	62.661
Description: Matures and demonstrates next generation Multi-Domain Operations extended range weapon system technology for Precision Strike Missile to increase survivability, penetration, and range in complex A2/AD and denied environments. Includes maturation and demonstration of advanced extended range missile technology and autonomous, unmanned launcher technology. *FY 2023 Plans:* Will develop and mature combined cycle extended range missile propulsion engine and autonomous unmanned launcher designs and perform critical sub-system assessments in preparation for system level integration. *FY 2024 Plans:* Will mature system detailed design that integrates combined cycle extended range missile propulsion engine and other critical component technologies such as navigation, guidance and control subsystems and perform subsystem and system level testing through laboratory, wind tunnel, and field tests. Mature development of modeling and simulation and hardware in the loop (HWIL) capability for evaluation of component design and system performance predictions. Will complete system level integration and test			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AF2 *I Long Range Maneuverable Fires (LRMF) Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
of an autonomous unmanned launcher and conduct field demonstrations of vehicle autonomy and remote launch pod control and munition live fire. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase to support Army high priority effort for agile acceleration of PrSM Inc IV extended range capability to reach TRL 6 in FY26. Significant ramp up in level of effort as the project moves from the extended range missile design activity to critical component and subsystem development on a compressed timeline, executed in parallel with autonomous unmanned launcher system integration and demonstration efforts. FY24 funding increase is a realignment in the amount of $16.118M from 0603464ACZ8 (PrSM Modular Payload Advanced Development).			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.170	-
Accomplishments/Planned Programs Subtotals	-	4.663	62.661

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army									Date: March 2023		
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*					**Project (Number/Name)** AG3 *I Extended Range Cannon Artillery (ERCA) Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AG3: *Extended Range Cannon Artillery (ERCA) Adv Tech*	-	3.003	3.354	-	-	-	6.480	9.418	11.309	11.432	0.000	44.996
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires (LRPF) Modernization Priority capabilities. This Project matures and demonstrates artillery technologies including light weight cannon and mount structures, high efficiency recoil cylinders, common lower power fire control hardware, improved fire control software, and improved sensor to shooter communications which will increase range and accuracy without an increase in platform weight. This Project also develops a collaborative environment with analytic capabilities to support Fires and Intel Soldiers.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Synchronized High Op-Tempo (SHOT) Targeting for LRPF *Description:* This effort develops a collaborative environment with analytic capabilities to support Fires and Intel Soldiers in organizing planning products, and analytics that automate data discovery and development of targets and streamlining workflows that support Course of Action development. *FY 2023 Plans:* Will mature software and technical documentation including drawings, concept of operation, and standard operating procedures. I. Will mature and optimize draft training technology package concepts. Will demonstrate targeting cycle support technologies in an operationally relevant exercise environment. Will mature all technology components for validation and demonstration in an integrated targeting data system. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects the planned lifecycle of this effort as the demonstration of targeting technologies will be completed in FY23.	3.003	3.232	-
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638	-	0.122	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AG3 *I Extended Range Cannon Artillery (ERCA) Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.003	3.354	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*				**Project (Number/Name)** AG5 *I Extended Range Artillery Munition Suite Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AG5: *Extended Range Artillery Munition Suite Adv Tech*	-	32.594	27.461	23.484	-	23.484	9.726	-	10.197	8.243	0.000	111.705
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities. This Project matures and demonstrates extended range artillery technologies including advanced projectile propulsion and guidance technologies to increase range and accuracy.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Extended Range Artillery Munition Suite Advanced Technology	32.594	25.113	20.272

Description: Matures and optimizes long range unitary artillery projectile systems in the areas of range, precision, counter-measure, and payload technologies.

FY 2023 Plans:
Continue demonstration of long-range unitary artillery projectile designs to validate system modeling and simulation (M&S), architectures, and component capabilities. Validate configurations of projectile technologies for increased performance. Demonstrate gun launched munition survivability and aeroballistic stability. Mature advanced range extending propulsion technologies. Complete demonstration of integrated technologies in extended range artillery projectiles including: guidance algorithms, sensors, propulsion, and range extension technologies. Mature extended range airframe concepts for conventional and cargo munitions for advanced effects compatible with current and future artillery systems. Demonstrate payload concepts and configurations for extended range gun-launched airframe delivered effects to include sub-munition dispensing techniques and survivability.

FY 2024 Plans:
Will demonstrate advanced range extension through in flight propulsion systems, optimized aeroballistic airframe geometries and precision technologies. Will optimize airframe architectures for integration of components to enable target seeking missions. Will demonstrate extended range munition concepts for conventional coordinate- seeking and cargo munitions. Will optimize payload integration for extended range gun-launched airframes to include sub-munition dispensing techniques and survivability.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AG5 / *Extended Range Artillery Munition Suite Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will optimize extended range projectile airframes to maximize range and effectiveness across current and developmental weapon platforms and propelling charge systems. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned lifecycle of this effort as the demonstration of extended range technologies will be completed.			
Title: Optionally Manned Artillery Advanced Technology *Description:* Develop automated cannon artillery solutions for fuze-setting, firing, as well as rearming to exponentially increase rate of fire and out-pace future near-peer, high operational-tempo (OPTEMPO) engagements, and reduce Soldier burden. *FY 2023 Plans:* Mature technologies for OPTEMPO long range fires concepts to include: automated fuze setting, automated re-arm and re-supply, and fire control and diagnostics. Mature modeling and simulation M&S concepts and analytical system trades to improve: the performance, effectiveness, and current and future operations of automated cannon artillery solutions. *FY 2024 Plans:* Will demonstrate technologies to improve the rate of fire of artillery systems including automated fuze setting, automated re-arm and re-supply, and fire control and diagnostics. Will validate modeling and simulation concepts that will increase the speed and performance of cannon artillery systems. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects planned lifecycle of this effort to cover the demonstration of integrated technologies.	-	1.802	3.212
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.546	-
Accomplishments/Planned Programs Subtotals	32.594	27.461	23.484

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires* *Advanced Technology*	**Project (Number/Name)** AG5 *I Extended Range Artillery Munition* *Suite Adv Tech*

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603464A I *Long Range Precision Fires* *Advanced Technology*					**Project (Number/Name)** AG7 I *Energetic Materials and Adv* *Processing Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AG7: *Energetic Materials and Adv Processing Adv Tech*	-	2.020	1.954	-	-	-	-	-	-	-	0.000	3.974
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities. This Project matures and demonstrates the performance of energetic materials ranging from medium caliber through large caliber weapons.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Scale-up of Insensitive Energetic Materials *Description:* This effort matures and demonstrates the performance and insensitivity of energetic materials ranging from 25mm medium caliber (direct fire) through 155mm large caliber (indirect fire) weapons. *FY 2023 Plans:* Will optimize energetic materials concepts and advanced processing methods to increase scale of manufacture designs and obtain higher throughput of ingredients and formulations. Will validate high-energy explosive and propellant formulations with advanced ignition components in representative applications. Will mature and validate high energy density formulations and material characterization of various insensitive energetic materials. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned conclusion of this effort	2.020	1.908	-
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:*	-	0.046	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AG7 *I Energetic Materials and Adv Processing Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	2.020	1.954	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603464A I *Long Range Precision Fires Advanced Technology*					**Project (Number/Name)** BO8 I *Long Range Precision Fires Advanced Tech (CA)*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BO8: *Long Range Precision Fires Advanced Tech (CA)*	-	48.000	102.000	-	-	-	-	-	-	-	0.000	150.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Congressional Interest Item funding provided for Long Range Precision Advanced Technology.

A. Mission Description and Budget Item Justification
 Congressional Interest Item funding provided for Long Range Precision Advanced Technology.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Program Increase - Hypervelocity Projectile Extended Range	25.000	25.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Hypervelocity Projectile Extended Range *FY 2023 Plans:* Congressional Interest Item funding provided for Hypervelocity Projectile Extended Range		
Congressional Add: Extended Range Artillery Munitions Suite	20.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Extended Range Artillery Munitions Suite		
Congressional Add: Program Increase - Maneuvering Submunitions for Precision Strike Missile	3.000	9.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Maneuvering Submunitions for Precision Strike Missile *FY 2023 Plans:* Congressional Interest Item funding provided for Maneuvering Submunitions for Precision Strike Missile		
Congressional Add: Program Increase - AFT COMBUSTOR RAMJET PROPULSION	-	10.000

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** BO8 / *Long Range Precision Fires Advanced Tech (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2023 Plans: Congressional Interest Item funding provided for AFT COMBUSTOR RAMJET PROPULSION		
Congressional Add: Program Increase - DEVELOPMENT AND TESTING OF PROPELLANTS USING ADVANCED MANUFACTURING	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for DEVELOPMENT AND TESTING OF PROPELLANTS USING ADVANCED MANUFACTURING		
Congressional Add: Program Increase - HYPERSONIC AND STRATEGIC MATERIALS AND STRUCTURES	-	8.000
FY 2023 Plans: Congressional Interest Item funding provided for HYPERSONIC AND STRATEGIC MATERIALS AND STRUCTURES		
Congressional Add: Program Increase - HYPERSONIC METAL ALLOYS	-	2.000
FY 2023 Plans: Congressional Interest Item funding provided for Hypersonic Metal Alloys		
Congressional Add: Program Increase - MISSILE MULTI AGENT EXTENSIBLE ENGAGEMENT SERVICES	-	15.000
FY 2023 Plans: Congressional Interest Item funding provided for MISSILE MULTI AGENT EXTENSIBLE ENGAGEMENT SERVICES		
Congressional Add: Program Increase - SUPER RAMJET ARTILLERY MISSION	-	8.000
FY 2023 Plans: Congressional Interest Item funding provided for SUPER RAMJET ARTILLERY MISSION		
Congressional Add: Program Increase - XM1155 GUIDED FLIGHT PROJECTILE	-	20.000
FY 2023 Plans: Congressional Interest Item funding provided for XM1155 GUIDED FLIGHT PROJECTILE		
Congressional Adds Subtotals	48.000	102.000

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 I 3				R-1 Program Element (Number/Name) PE 0603464A I *Long Range Precision Fires Advanced Technology*						Project (Number/Name) BY2 I *Advanced Hypersonic Technology*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BY2: *Advanced Hypersonic Technology*	-	37.740	36.517	64.136	-	64.136	49.592	50.808	50.835	51.633	0.000	341.261
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Hypersonic Precision Fires Modernization Priority capabilities by developing and maturing critical technologies for strategic missiles. Technology development includes critical technologies to improve strategic missile components such as advanced structures and materials, thermal protection systems, navigation systems, data links, and seekers/terminal sensors.

The cited research is consistent with Under Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (U.S.) Army Futures Command (AFC) in coordination with the United States Army Rapid Capabilities and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Hypersonics Advanced Technology ***Description:*** This effort matures and demonstrates new subsystems and components of a hypersonic weapon delivery system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other payoff/ time critical targets. ***FY 2023 Plans:*** Will optimize candidate Common Hypersonic Glide Body (CHGB) thermal protection materials and material processing techniques to support critical material decisions for hypersonic weapon applications; will mature simulation tools for optimization of vehicle flight performance; will mature Guidance Navigation & Control (GN&C) technology to reduce both size, weight, and power (SWAP) / packaging and reliance on GPS for navigation accuracy and will mature seeker / terminal sensor technologies. ***FY 2024 Plans:*** Will complete development and transition of 2D/3D carbon-carbon thermal protection materials and material processing techniques and standards to design agent and industry partners in support of critical material decisions for the Common Hypersonic Glide Body (CHGB). Will demonstrate guidance, navigation and control technology to reduce both size, weight, and power (SWAP) packaging and reliance on GPS for navigation accuracy in contested environments. Will mature and demonstrate	37.740	35.184	64.136

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023	
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603464A I *Long Range Precision Fires* *Advanced Technology*	**Project (Number/Name)** BY2 I *Advanced Hypersonic Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
seeker and terminal sensor component technologies to include seeker window, antenna, and transceiver for hypersonic weapon applications. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase in FY24 reflects planned program development and demonstration of seeker and navigation component technologies and supports transition of thermal protection materials for the Common Hypersonic Glide Body (CHGB) and the Long Range Hypersonic Weapon system.			
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	1.333	-
Accomplishments/Planned Programs Subtotals	37.740	36.517	64.136

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	

Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*			**Project (Number/Name)** CZ8 *I PrSM Modular Payload Advanced Development*				

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CZ8: *PrSM Modular Payload Advanced Development*	-	-	14.731	2.743	-	2.743	2.808	10.232	33.278	33.307	0.000	97.099
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by maturing and demonstrating critical technologies for autonomous, Cluster Munition policy compliant, enhanced lethality payloads deployed from Precision Strike Missile to autonomously and cooperatively find and engage the full spectrum of deep moved, moving, dispersed, and poorly located targets in areas with contested access at extended ranges.

Research in this Project complements Program Element (PE) 0602147A (Long Range Precision Fires Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Precision Strike Missile (PrSM) Advanced Development/PrSM Modular Payload	-	14.193	2.743

Description: Mature and demonstrate critical technologies for the delivery of distributed and enhanced lethality capabilities via extended range missiles. Technology examples include: sensor and associated signal processing technologies for target acquisition, identification, and engagement; datalink and communications technologies to transmit targetable data; compact propulsion technologies to enable dwell time on station; payload dispensing technologies for deploying these payloads from high speed long range missiles; and advanced extended range missile propulsion and guidance technologies.

FY 2023 Plans:
Continue enhanced lethality payload designs, initiate sub-system testing verifying expected component performance, begin development of advanced extended range missile propulsion and guidance technologies, and update high fidelity simulations to assess integrated missile performance.

FY 2024 Plans:
Will continue to mature critical component technologies and integrate payload enhanced lethality models and autonomy algorithms in high fidelity simulation to optimize missile terminal engagement performance.

FY 2023 to FY 2024 Increase/Decrease Statement:

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** CZ8 *I PrSM Modular Payload Advanced Development*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
FY24 funding reduced (-$16.118M) and realigned to PE 0603464/Project AF2 Long Range Maneuverable Fires to accelerate advanced technologies for PrSM Increment IV extended range capabilities, Army priority effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.538	-
Accomplishments/Planned Programs Subtotals	-	14.731	2.743

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603465A I Future Vertical Lift Advanced Technology						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	255.323	272.551	158.795	-	158.795	165.415	176.397	170.614	181.828	0.000	1,380.923
AI8: *Alternative Concept Engine Advanced Technology*	-	3.689	2.038	-	-	-	-	-	-	-	0.000	5.727
AJ3: *Next Generation Rotorcraft Transmission Adv Tech*	-	1.353	-	-	-	-	-	-	-	-	0.000	1.353
AJ7: *Advanced Rotors Advanced Technology*	-	2.387	-	-	-	-	-	-	-	-	0.000	2.387
AJ9: *Integ Mission Equip for Vert Lift Systems Adv Tech*	-	23.037	25.066	17.095	-	17.095	3.391	-	-	-	0.000	68.589
AK3: *Aviation Survivability Advanced Technology*	-	3.821	4.103	-	-	-	-	-	-	-	0.000	7.924
AK5: *Multi-Role Small Guided Missile Advanced Tech*	-	5.653	11.209	11.795	-	11.795	7.093	-	-	-	0.000	35.750
AK7: *Adv Rotorcraft Armaments Protection Sys Adv Tech*	-	10.157	9.580	-	-	-	-	-	-	-	0.000	19.737
AK8: *Air Launched Effects Advanced Technology*	-	27.850	28.798	28.018	-	28.018	28.026	28.059	28.078	28.385	0.000	197.214
AL1: *Adv Teaming for Tactical Aviation Oper Adv Tech*	-	38.495	35.579	40.060	-	40.060	44.216	58.482	48.276	48.816	0.000	313.924
AL3: *HPC for Rotorcraft Applications Adv Tech*	-	4.888	-	-	-	-	-	-	-	-	0.000	4.888
AL7: *Full Spectrum Targeting Advanced Technology*	-	9.038	8.599	8.955	-	8.955	9.630	10.378	10.372	10.475	0.000	67.447
AL9: *Holistic Sit Awareness and Dec Making Adv Tech*	-	18.679	29.300	21.128	-	21.128	19.870	20.942	22.930	23.181	0.000	156.030
BP8: *Future Vertical Lift Air Platform Adv Tech (CA)*	-	82.500	94.750	-	-	-	-	-	-	-	0.000	177.250
CA8: *Adv Rotorcraft Armaments Protection Sys*	-	1.189	2.862	6.388	-	6.388	1.254	4.169	10.312	12.850	0.000	39.024

PE 0603465A: *Future Vertical Lift Advanced Technology*
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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*						
CC4: *FVL Radar Advanced Technologies*	-	3.854	3.342	4.403	-	4.403	-	2.384	2.387	2.413	0.000	18.783
CG1: *Holistic Team Survivability Adv Tech*	-	6.189	11.898	15.339	-	15.339	16.409	21.261	17.359	17.625	0.000	106.080
CH6: *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*	-	4.394	-	-	-	-	-	-	-	-	0.000	4.394
CH7: *Power & Thermal Management for FVL Adv Tech*	-	3.278	4.396	4.294	-	4.294	5.448	7.562	5.488	7.098	0.000	37.564
CH8: *UAS Survivability Adv Technology*	-	4.872	-	-	-	-	-	-	-	-	0.000	4.872
CI8: *Adaptive Avionics Advanced Technologies**	-	-	-	-	-	-	10.776	18.894	18.907	19.113	0.000	67.690
CJ5: *Future Vertical Lift Medical Advanced Technology*	-	-	1.031	1.320	-	1.320	1.593	1.595	1.598	1.602	0.000	8.739
CK2: *High Speed Maneuverable Missile (HSMM) Adv Tech**	-	-	-	-	-	-	17.709	2.671	4.907	10.270	0.000	35.557

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2024

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates manned and unmanned air vehicle and mission system technologies as well as advanced teaming capabilities to enable Army Future Vertical Lift. Emphasis is on platform and mission system technologies to enhance manned and unmanned air vehicle combat and combat support operations for attack, reconnaissance, air assault, survivability, logistics, and command and control missions. Within this PE, aviation technologies are advanced and integrated into realistic and robust demonstrations.

Research in this PE contributes to the Army Science and Technology (S&T) air systems portfolio and is fully coordinated with efforts in PE 0602148A (Future Vertical Lift Technology), PE 0602183A (Air Platform Applied Research) and PE 0603043A (Air Platform Advanced Technology).

A portion of this PE is directly aligned to the Future Vertical Lift (FVL) Army Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas and the Army Modernization Strategy.

Research in this PE is performed by the United States Army Futures Command (AFC) and the Army Engineering Research and Development Center (ERDC).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	

B. Program Change Summary ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**
Previous President's Budget	261.880	177.836	170.020	-	170.020
Current President's Budget	255.323	272.551	158.795	-	158.795
Total Adjustments	-6.557	94.715	-11.225	-	-11.225
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	94.750			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.557	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-11.225	-	-11.225
• FFRDC Transfer	-	-0.035	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2022**	**FY 2023**
Project: BP8: *Future Vertical Lift Air Platform Adv Tech (CA)*		
Congressional Add: *Joint Tactical Aerial Resupply Vehicle*	8.000	-
Congressional Add: *Surface Tolerant Advanced Adhesives*	4.000	-
Congressional Add: *Program Increase - UH-60 Main Rotor Blade Modernization*	5.000	5.000
Congressional Add: *20MM Chaingun Development for FLRAA*	8.000	-
Congressional Add: *Air Launched Turbojet Missile*	15.000	-
Congressional Add: *Composite Structures*	5.000	-
Congressional Add: *Program Increase - Data Refinement and Optimization for Aviation Sustainment*	4.500	4.500
Congressional Add: *Degraded Visual Environment*	3.500	-
Congressional Add: *Digital Backbone*	5.000	-
Congressional Add: *Elastomeric Imaging*	3.000	-
Congressional Add: *Program Increase - Fleetspace Maintenance Tool*	4.500	5.250
Congressional Add: *Program Increase - Platform Digitization and Maintenance*	5.000	7.000
Congressional Add: *Program Increase - Stretch Broken Carbon Fiber*	10.000	10.000
Congressional Add: *Program Increase - UAS Fuel Systems Enhancements*	2.000	2.000
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING CAPABILITY*	-	2.000

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Exhibit R-2, **RDT&E Budget Item Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING FOR FVL*	-	10.000
Congressional Add: *Program Increase - AUTONOMOUS CONFIGURATION MANAGEMENT AND AVIATION RECORDS*	-	10.000
Congressional Add: *Program Increase - DLC COATINGS FOR RED PHOSPHOROUS OBSCURANTS*	-	3.000
Congressional Add: *Program Increase - FVL SURFACE TOLERANT ADHESIVES*	-	9.000
Congressional Add: *Program Increase - INDIVIDUAL BLADE AND HIGHER HARMONIC CONTROL*	-	22.000
Congressional Add: *Program Increase - Multi-Drone, Multi-Sensor ISR*	-	5.000
Congressional Add Subtotals for Project: BP8	82.500	94.750
Congressional Add Totals for all Projects	82.500	94.750

Change Summary Explanation

Decreased funding to support higher priorities within the Science & Technology (S&T) portfolio.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** AI8 *I Alternative Concept Engine Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AI8: *Alternative Concept Engine Advanced Technology*	-	3.689	2.038	-	-	-	-	-	-	-	0.000	5.727
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project provides demonstration of adaptable, fuel efficient, and high power to weight engine technologies for potential application to Future Vertical Lift platforms. Research includes development of alternative, adaptive and smart engine technologies to provide improved performance, readiness and affordability across the engine operating envelope for increased operational capability.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Alternative Concept Engine (ACE)	1.658	-	-
Description: This effort demonstrates alternative, adaptive, and intelligent engine technologies to provide improved / mission-optimized performance, readiness and affordability across an expanding engine envelope for increased operational capability for Future Vertical Lift (FVL) platforms. The alternative concept engine technology demonstrations planned for this effort are applicable to current and future platforms.			
Title: Improved Propulsion Technology Demonstration (IPTD)	2.031	2.037	-
Description: Effort will develop and execute an advanced engine integration, maintenance, and capability improvement strategy to produce key technology advancements on Future Long Range Assault Aircraft (FLRAA) engine systems, including the ACE engine technologies as appropriate. Full engine validation testing will be completed to TRL 6 providing improved propulsion system performance, maintainability, and durability while reducing integration risk for FVL FLRAA Platform. *FY 2023 Plans:*			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AI8 / *Alternative Concept Engine Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will perform engine technology trade-off analyses to optimize improvements in engine performance, weight, maintainability, and durability to meet FLRAA capability needs. Will perform advanced engine integration analyses to reduce engine integration risk onto FLRAA and enduring platforms. **FY 2023 to FY 2024 Increase/Decrease Statement:** This effort ends in FY23			
Title: SBIR/STTR Transfer **Description:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 Plans:** Funding transferred in accordance with Title 15 USC §638 **FY 2023 to FY 2024 Increase/Decrease Statement:** Funding transferred in accordance with Title 15 USC §638	-	0.001	-
Accomplishments/Planned Programs Subtotals	3.689	2.038	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** AJ3 *I Next Generation Rotorcraft Transmission Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AJ3: *Next Generation Rotorcraft Transmission Adv Tech*	-	1.353	-	-	-	-	-	-	-	-	0.000	1.353
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and ground demonstrates variable-speed transmission technologies that can be matured and integrated into the development of Future Vertical Lift (FVL) platforms.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: High Reduction-Ratio Transmission.	1.353	-	-
Description: This effort will mature and demonstrate the technologies necessary for development, design, fabrication, and testing of a high reduction-ratio transmission in two stages or less (60:1 reduction ratio) with high efficiency and improved reliability against corrosion and seal leakage. Technology demonstrations from this effort will be applicable to FVL platforms.			
Accomplishments/Planned Programs Subtotals	1.353	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army									**Date:** March 2023		
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** AJ7 *I Advanced Rotors Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AJ7: *Advanced Rotors Advanced Technology*	-	2.387	-	-	-	-	-	-	-	-	0.000	2.387
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates and integrates new technologies that enable global and highly efficient/reliable operations for Future Vertical Lift (FVL) aircraft and Future Unmanned Aircraft Systems (FUAS) throughout the flight envelope.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: High Speed, Highly Efficient Rotors	2.387	-	-
Description: This effort demonstrates full scale, integrated rotor system technologies through the assessment of alternative designs aimed to satisfy future capability needs for FVL increased system durability, efficiency, speed, range, and payload. Technologies include: integrated high speed, low drag rotor technologies for high speed configurations; interactional aerodynamics tailoring between rotor and body & auxiliary lift/ propulsors; light weight, low volume, efficient and high authority EMAs; reliable and robust actuators/hubs/controls for IBC/swashplateless rotors; active/passive flow control; and automated track and balance.			
Accomplishments/Planned Programs Subtotals	2.387	-	-

C. Other Program Funding Summary ($ in Millions)
N/A
Remarks

D. Acquisition Strategy
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3				**R-1 Program Element (Number/Name)** PE 0603465A I *Future Vertical Lift Advanced Technology*					**Project (Number/Name)** AJ9 I *Integ Mission Equip for Vert Lift Systems Adv Tech*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AJ9: *Integ Mission Equip for Vert Lift Systems Adv Tech*	-	23.037	25.066	17.095	-	17.095	3.391	-	-	-	0.000	68.589
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a mission systems architecture to support Future Vertical Lift (FVL) through utilization of a reconfigurable and flexible tiered architectural approach.

This Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Integrated Mission Equipment for Vertical Lift Systems	23.037	24.278	17.095
Description: Develops and demonstrates a mission systems architecture to support FVL through utilization of a reconfigurable and flexible tiered architectural approach. The approach will consist of the following: Maturing and implementing Model Based Engineering methods and Modular Open Systems Architecture strategies; instantiating an architecture verification environment and developing an agile and resilient digital backbone to support the rapidly changing threat environment including the digital battleground. *FY 2023 Plans:* Mature and improve automation of AVE capabilities to validate and verify FY21 National Defense Authorization Act MOSA requirements. Demonstrate AVE capabilities to evaluate Future Vertical Lift and Enduring Fleet vendor designs for MOSA conformance. Demonstrate incremental airworthiness and cyber security qualification for infrastructure capabilities enabling affordability and faster to field for innovative integration. Demonstrate Digital Backbone A-Kit performance and ability to ease mission systems installation in an experimental UH-60M aircraft. Demonstrate third party integration of mission system components in the MSFTB lab. *FY 2024 Plans:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AJ9 *I Integ Mission Equip for Vert Lift Systems Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will complete automation of AVE, demonstrate representative capability to verify MOSA requirements, transition specification and architecture repository. Will install and flight test digital backbone technologies on experimental UH-60M aircraft. Will integrate, install, and demonstrate multiple sets of mission system components using multiple third party integrators in the MSFTB lab and conduct flight test on experimental UH-60M aircraft.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding decrease in FY24 reflects completion of aircraft modifications.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.788	-
Accomplishments/Planned Programs Subtotals	23.037	25.066	17.095

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023		

| Appropriation/Budget Activity
2040 / 3 | | R-1 Program Element (Number/Name)
PE 0603465A / Future Vertical Lift Advanced Technology | | Project (Number/Name)
AK3 / Aviation Survivability Advanced Technology | |

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AK3: *Aviation Survivability Advanced Technology*	-	3.821	4.103	-	-	-	-	-	-	-	0.000	7.924
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates increased Future Vertical Lift (FVL) survivability through the integration and demonstration of technologies that reduce platform signatures, improve threat warning and countermeasures against integrated networked air and ground threat systems. Also matures and demonstrates unmanned aircraft systems (UAS) survivability technologies to enable manned/unmanned team based approaches to enable operation in contested peer/near peer environments.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Survivability Against Integrated Networked Threats	3.821	3.953	-
Description: This effort increases rotorcraft survivability by reducing platform signatures, providing the means to more efficiently counter enemy detection and tracking systems ***FY 2023 Plans:*** Will continue to mature own-ship Aircraft Survivability Correlator capabilities and technologies. Will begin integration and ground testing of Aircraft Survivability Correlator software onto a surrogate FVL aircraft. Will demonstrate Aircraft own- ship Survivability Correlator at an open air range with surrogate threat systems to avoid and counter. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned conclusion of this effort			
Title: SBIR/STTR Transfer	-	0.150	-
Description: Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:***			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK3 *I Aviation Survivability Advanced Technology*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement:			
Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.821	4.103	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** AK5 *I Multi-Role Small Guided Missile Advanced Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AK5: *Multi-Role Small Guided Missile Advanced Tech*	-	5.653	11.209	11.795	-	11.795	7.093	-	-	-	0.000	35.750
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a holistic lethality solution for current Army Aviation and Future Vertical Lift (FVL) Modernization Priority. This Project matures and demonstrates critical technology and designs components for future affordable rockets and missiles to provide overwhelming defeat of conventional and asymmetrical threats in all environments. Matures and demonstrates component technologies to enable an expeditionary short-to-medium range loitering maneuvering missile with man-in-the-loop capability for situational awareness, targeting, and lethal effects against hard and soft targets; and matures and demonstrates critical component technology and designs for future missiles that provide simultaneous multiple launch, control, and supervised autonomous terminal engagement of multiple missiles.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Multiple Simultaneous Engagement Technologies (MSET) *Description:* Matures and demonstrates critical component technology and designs for future missiles that provide simultaneous multiple launch, control, and supervised autonomous terminal engagement of multiple missiles against stationary and moving hard/soft targets, image-based target discrimination/shared situation awareness/lock-on, and multi-missile control digital datalink with inter-missile cooperative networked communications. The end-state is a multi-missile Organic command and control (C2) solution that handles all aspects of sensor integration, fire control, and airspace management. This capability will support overwhelming lethal effects against anti-access/aerial denial (A2AD) / Integrated Air Defense Systems (IADS). *FY 2023 Plans:* Exercise flight hardware and software in the HWIL laboratory while simulating flight environments to demonstrate system performance and form predictions of outcome for simultaneous missile engagements, dynamic re-tasking of missiles in flight, target acquisition, terminal engagement, and operator workload. Continue high-fidelity simulation analyses against MSET	5.653	10.980	11.795

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603465A I *Future Vertical Lift Advanced Technology*	Project (Number/Name) AK5 I *Multi-Role Small Guided Missile Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
scenarios to verify subcomponent function and perform relevant trades to feed HWIL and flight test asset integration efforts. Use simulation and HWIL results to continue developmental flight tests to demonstrate and validate system performance. *FY 2024 Plans:* Will optimize and validate MSET HWIL and high-fidelity simulation using MSET hardware and software data from integrated flight demonstrations. Will mature and demonstrate MSET fire control, command and control (C2) communication for missile simultaneous engagements. Will mature and demonstrate MSET digital command link for missile to missile and C2 communications. Will mature and advance supervised autonomous target acquisition and terminal target engagement that enable a single user to launch and supervise simultaneous multi-missile engagements. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.229	-
Accomplishments/Planned Programs Subtotals	5.653	11.209	11.795

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	

Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603465A I *Future Vertical Lift Advanced Technology*	Project (Number/Name) AK7 I *Adv Rotorcraft Armaments Protection Sys Adv Tech*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AK7: *Adv Rotorcraft Armaments Protection Sys Adv Tech*	-	10.157	9.580	-	-	-	-	-	-	-	0.000	19.737
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project investigates and demonstrates a holistic lethality solution for Future Vertical Lift (FVL) offensive and defensive applications, focused on but not limited to Future Attack Reconnaissance Aircraft. Develop components for use in multi-role armament solutions for fire control, armament systems, munitions and integration of threat agnostic countermeasures.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Rotorcraft Armament and Protection System (ARAPS) - Future Attack Reconnaissance Aircraft (FARA)	9.572	6.557	-
Description: This effort matures and demonstrates a holistic medium caliber lethality solution for Future Vertical Lift offensive applications. Develops components for use in multi-role armament solutions for fire control, software, armament systems, and munitions.			
FY 2023 Plans: Will integrate medium caliber weapon with aviation specific fire control software. Will mature and demonstrate turreted medium caliber weapon platforms with targeting solution software for use in aviation systems including Future Vertical Lift Future Attack Reconnaissance Aircraft.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding decrease reflects planned conclusion of this effort.			
Title: ARAPS-Dispenser	0.585	2.733	-

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603465A I *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK7 I *Adv Rotorcraft Armaments Protection Sys Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort matures and demonstrates a dispenser countermeasure, a component of the holistic survivability solution for Future Vertical Lift defensive applications. Develop components for use in multi-role countermeasure solutions for fire control, software and countermeasure systems. *FY 2023 Plans:* Will optimize tracking and dispensing capabilities for countermeasure dispenser to increase survivability of current and future aviation platforms. Will mature capability of fire control systems with use of countermeasure dispenser. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease reflects planned conclusion of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.290	-
Accomplishments/Planned Programs Subtotals	10.157	9.580	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK8 *I Air Launched Effects Advanced Technology*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AK8: *Air Launched Effects Advanced Technology*	-	27.850	28.798	28.018	-	28.018	28.026	28.059	28.078	28.385	0.000	197.214
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates the ability to launch an Unmanned Aircraft System (UAS) from a manned or unmanned Future Vertical Lift (FVL) aircraft at tactical altitudes and to control the UAS from the cockpit or a crew station; and assesses the enabled capabilities and determine their relevance to current Army Aviation engagement and survivability portfolios.

Research in this Project is fully coordinated with Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Air Launched Effects	27.850	27.884	28.018

Description: Develop and demonstrate the ability to launch a future unmanned aircraft system (FUAS) from FVL platform at tactical altitudes, and to control the UAS from the cockpit or a crew station. Assess the enabled capabilities and determine their relevance to current Army Aviation engagement and survivability portfolios. These air-launched FUAS will employ a variety of non-lethal effects including: electronic attack, decoy, and communications relay.

FY 2023 Plans:
Integrate electronic warfare (EW) payload and employment software into air launched effects air vehicle and evaluate ability to disrupt and jam threat systems using a single human supervising teams of air launched effects UAS through flight testing. Integrate secure, anti-jam communications payload into air launched effects UAS and evaluate effectiveness for Joint all-domain operations. Verify ability to rapidly insert software and payload technologies into the modular open systems approach (MOSA) based mission system architecture. Demonstrate team of Detect, Identify, Locate, and Report (DILR), Decoy, Disrupt, and Lethal air launched effects UAS, equipped with advanced teaming software, executing collaborative reconnaissance, surveillance, target

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK8 *I Air Launched Effects Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
acquisition (RSTA), coordinated attack, decoy, and EW to disrupt or jam as a part of a multi-domain combined arms team through participation in Joint all-domain flight experiments. *FY 2024 Plans:* Will further mature and demonstrate decoy and disrupt electronic warfare (EW) air launched effects capabilities through multi-UAS behaviors and novel payloads. Will evaluate range and throughput capabilities of secure, anti-jam communications payloads during teamed flight operations. Will enhance mission systems and system hardening to align with A-CDD. Will demonstrate teams of Detect, Identify, Locate, and Report (DILR), Decoy, Disrupt, and Lethal air launched effects UAS, equipped with advanced teaming software, executing synchronized operations facilitating integrated air defense system (IADS) breach capability in contested conditions through participation in Joint All-Domain Operations. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding decrease due to narrowing of effort scope to focus on maturing ALE-Small operational capabilities and targeted effects payloads.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.914	-
Accomplishments/Planned Programs Subtotals	27.850	28.798	28.018

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*				**Project (Number/Name)** AL1 *I Adv Teaming for Tactical Aviation Oper Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AL1: *Adv Teaming for Tactical Aviation Oper Adv Tech*	-	38.495	35.579	40.060	-	40.060	44.216	58.482	48.276	48.816	0.000	313.924
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates and drafts frameworks for autonomous teaming behaviors and autonomous decision making for Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platform formations in combined arms operations.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Advanced Teaming Demonstration	30.885	26.475	-
Description: Develop and demonstrate teaming behaviors and autonomous decision making for mixed FVL and FUAS platform formations in combined arms operations that are beyond current Manned-Unmanned Teaming (MUM-T) technologies. Focus areas include: resilient autonomous algorithms; self-organizing unmanned formations; distributed command and control; and navigation. This effort will also demonstrate multi-platform distributed apertures of multispectral sensors for threat detection and awareness and improved reliability through adaptation in autonomous systems. ***FY 2023 Plans:*** Mature and flight-demonstrate advanced teaming technologies integrated into mission systems architecture for real-time mission planning and synchronized execution of collaborative team reconnaissance, surveillance, target acquisition (RSTA), coordinated attack, decoy, and electronic warfare (EW) to disrupt or jam using mixed formations of manned and unmanned aircraft, including air launched effects, as a part of a multi-domain combined arms team through participation in Joint all-domain experiments. Test and evaluate autonomous in-stride replanning software that dynamically adapts battlefield situational awareness updates, network connectivity, and team member capability. Simulate autonomous team of teams operations facilitating integrated air defense			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603465A I *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL1 I *Adv Teaming for Tactical Aviation Oper Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
system (IADS) breach capability in contested conditions using mission representative vignettes. Further enhance and verify modular open systems integration approaches for rapidly upgradable and transitionable team autonomy. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This effort ends in FY23 and funding is realigned to Complex Advanced Teaming Operations within this project.			
Title: Sensors / Multi-Function Imagers for Future Aviation ***Description:*** Mature and demonstrate multi-function sensing system concepts to increase FVL manned platform survivability and situational awareness. This will enable the manned FVL platforms to engage in multi-domain advanced teaming operations and leverage autonomous behaviors of both manned and unmanned aviation platforms. This effort will enable tactical operations in complex environments (e.g. high threat, degraded visuals, and urban) through the use of sensing modules suitable for multiple tactical applications. The multifunction sensor approach will mitigate the need for separate dedicated threat warning and situational awareness imaging sensor modules, thus reducing the total cost and logistics burden for future aviation systems. ***FY 2023 Plans:*** Demonstrate digital readout integrated circuits integrated into multispectral camera modules for improved pilotage and threat warning capabilities. Validate multispectral sensing and threat warning capabilities against various signatures and clutter. Optimize digital readout frame integration, adjustable frame rate and image processing settings for improved camera performance in varying environments and concepts of operations. ***FY 2024 Plans:*** Will mature and optimize an aircraft-hardened multispectral multifunction camera using a proven digital readout integrated circuit for aerial threat warning and situational awareness data collection. Will mature multispectral sensing and threat warning capabilities and establish a threat warning performance baseline. Will conduct flight demonstration of flyable multispectral sensor in relevant environments. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.	7.610	8.125	8.486
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:***	-	0.979	-

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advanced Technology	Project (Number/Name) AL1 / Adv Teaming for Tactical Aviation Oper Adv Tech

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding transferred in accordance with Title 15 USC §638			
Title: Complex Advanced Teaming Operations	-	-	31.574
Description: Mature and demonstrate teaming behaviors and autonomous decision making for mixed FVL and FUAS platform formations in complex and contested operational environments. Focus includes maturing solutions that overcome unique challenges associated with autonomy, teaming, range, communication, navigation and mission operations in littoral and urban / fringe environments, while adhering to MOSA strategy for rapid insertion and affordability. *FY 2024 Plans:* Will adapt and enhance autonomy and teaming technologies for use in complex environment operations, specifically addressing range, navigation, and communication challenges; evaluate initial team dynamic retasking, reconfigurability, and mission execution capabilities within complex and contested operational environments; demonstrate autonomous team of teams synchronized operations facilitating integrated air defense system (IADS) breach capability in contested conditions through participation in Joint all-domain experiments. *FY 2023 to FY 2024 Increase/Decrease Statement:* This effort begins in FY24 with funding realigned from Advanced Teaming Demonstration within this project.			
Accomplishments/Planned Programs Subtotals	38.495	35.579	40.060

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*						**Project (Number/Name)** AL3 *I HPC for Rotorcraft Applications Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AL3: *HPC for Rotorcraft Applications Adv Tech*	-	4.888	-	-	-	-	-	-	-	-	0.000	4.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates the use of high-fidelity computational fluid dynamics for Future Vertical Lift (FVL) platforms through the utilization of Department of Defense (DoD) High- Performance Computing (HPC) and software tools for cutting-edge modeling and simulation, as well as adding software capabilities for workflow automation and design space exploration. Efforts in this Project are also applicable to the family of Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platforms.

Work in this Project is complements Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Engineered Resilient Systems (ERS) for Army Aviation **Description:** This effort supports Future Vertical Lift by exploiting advancements in physics-based software tools to provide rapid engineering analysis of proposed rotorcraft platforms, providing high-fidelity computational modeling of candidate Future Attack Reconnaissance Aircraft (FARA) platforms during the FARA down-selection, increasing the speed of simulations by automating simulation setup and execution on DoD HPC systems, and maturing and demonstrating the use of advanced machine learning techniques for aviation datasets to inform both the development of FVL systems and current operations.	2.874	-	-
Title: Engineered Resilient Systems (ERS) for Advanced Army Aviation Concepts **Description:** This effort supports Future Vertical Lift (FVL) by utilizing advanced machine-assisted design algorithms to explore design spaces and choose resilient platform variants. Advanced computational techniques will leverage automated design processes to expand computational testbeds in support of testing and evaluation. Increase high accuracy physics in modeling and simulation to optimize platforms for all operational environments and mission scenarios. Provide multi-fidelity computational models of candidate Future Attack Reconnaissance Aircraft (FARA), Future Long-Range Assault Platforms (FLRAA), and Future Tactical Unmanned Aircraft Systems (FTUAS) platforms to support acquisition decision-makers.	2.014	-	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL3 *I HPC for Rotorcraft Applications Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Accomplishments/Planned Programs Subtotals	4.888	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** AL7 *I Full Spectrum Targeting Advanced Technology*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AL7: *Full Spectrum Targeting Advanced Technology*	-	9.038	8.599	8.955	-	8.955	9.630	10.378	10.372	10.475	0.000	67.447
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates next generation targeting concepts for Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platforms.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Full Spectrum Targeting	9.038	8.418	8.955

Description: This effort will mature and demonstrate key targeting sensor system concepts to enable the FVL and FUAS modernization priorities. Effort will leverage advancements in laser, infrared imaging focal plane arrays, compact long-range optics, and multispectral system technologies to develop a stabilized, payload that can actively and/or passively image in multiple spectral bands simultaneously to provide robust targeting and situational awareness capabilities for the prevailing battlefield conditions. Effort will demonstrate the ability of multispectral sensing to autonomously scan areas of interest and identify tactical threats with reduced cognitive workloads through sensor fusion and automated spectral selection.

FY 2023 Plans:
Demonstrate improved threat detection range performance using a steerable turret with dual-band infrared sensor paired to novel, compact long-range optical components. Validate approaches for multispectral imaging to detect military targets in relevant environments. Optimize automated scanning and processing techniques in multiple spectral bands suitable for detection, recognition and identification (DRI) of FVL and FUAS relevant target sets. Optimize sensor fusion techniques and automatic selection of optimal spectral bands to reduce FVL and FUAS operator burden. Validate automated sensor scanning and DRI performance.

FY 2024 Plans:

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL7 *I Full Spectrum Targeting Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will provide assessment of long range optics performance against military targets in relevant environments. Will provide baseline sensor architecture specifications for steerable turret with dual-band infrared sensor paired with novel compact long-range optical components. Will validate performance of improved multi-band fused Aided Target Recognition (AiTR) algorithms. Will conduct payload demonstration of range performance, Degraded Visual Environment (DVE) capability, and automation of target recognition and acquisition times. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.181	-
Accomplishments/Planned Programs Subtotals	9.038	8.599	8.955

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*				**Project (Number/Name)** AL9 *I Holistic Sit Awareness and Dec Making Adv Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AL9: *Holistic Sit Awareness and Dec Making Adv Tech*	-	18.679	29.300	21.128	-	21.128	19.870	20.942	22.930	23.181	0.000	156.030
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a pilotage and decision aiding system that allows for care free operations in complex and hostile environments through: demonstration of a comprehensive human machine interface for all situational awareness (SA) domains (terrain & obstacles, threat, weather, & environment); and demonstration of decision aiding technologies to reduce cognitive loading of air crews during operations in complex and hostile environments.

Research in this Project is fully coordinated with Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Holistic Situational Awareness and Decision Making	9.210	12.393	12.826
Description: This program directly contributes to Future Vertical Lift (FVL) to ensure Future Aircraft pilots have the necessary situational awareness, accurate understanding of the tactical mission, and ability to decide faster than our adversaries. *FY 2023 Plans:* Demonstrate FVL cockpit crew increased effectiveness and decreased workload when equipped with a situational awareness world model, decision aiding tools, pilot-on-the-loop autonomy, and multi-sensory cueing. Workload and effectiveness will be measured using both subjective and objective means including biometrics. Participate in Fiscal Year 2023 (FY23) Project Convergence through flight demonstration to assess this capability's impact in relevant mission scenarios. *FY 2024 Plans:* Will demonstrate an increase in FVL crew station effectiveness through pilot workload management scenarios that investigate scalable automation methods for select mission tasks while performing simulated combat missions. The automation will leverage an experimental situational awareness data model, and workload and effectiveness will be measured using both subjective and			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL9 *I Holistic Sit Awareness and Dec Making Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
objective means, including biometrics. Will participate in Fiscal Year 2024 (FY24) Project Convergence through flight simulation demonstration to assess this capability's impact in relevant mission scenarios. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Multi-function RF for FVL Platforms ***Description:*** This effort matures and demonstrates multi-function radio-frequency (RF) sensor technologies to support the FVL family of systems. It provides integrated software and hardware technologies that enable the use of common electronics and system components to support varied functions, such as enhanced situational awareness, threat-detection and localization, targeting, communications, and aircraft pilotage. This will result in improved performance for these critical functions and reduced requirements for size, weight, and power for mission equipment across FVL platforms. ***FY 2023 Plans:*** Develop multi-function RF components from derived technical specifications. Characterize the components in the laboratory and analyze their expected performance against the full set of mission requirements. Develop software to enable resource management of multiple RF functional modes. Complete design of the overall RF multi-function radio-frequency (RF) sensor system including hardware and software. ***FY 2024 Plans:*** Will utilize technical designs and analysis to mature multi-function RF sensor system hardware. Will demonstrate resource management of multiple RF functional modes and mode software on multi-function system hardware. Will validate performance of multi-function technology against relevant targets and current and emerging threats to support the FVL family of systems. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease represents completion of initial engineering design and development of sensor system necessary to enable demonstrations of the multiple RF functional modes.	7.585	13.886	6.188
Title: Early Human Systems Integration Demonstrations ***Description:*** Human Systems Integration (HSI) analysis assesses and matures technologies to optimize pilot situational awareness and workload management, crew task automation and decision-aiding, information management, and advanced crew station interfaces. The objective of this effort is to reduce crew decision and task execution timelines in a tactically challenging mission environment. ***FY 2023 Plans:***	1.884	2.011	2.114

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL9 *I Holistic Sit Awareness and Dec Making Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Demonstrate effects of crew task automation, decision-aiding, and augmented pilot displays on Soldier performance and system effectiveness by conducting human performance and human-system interface analyses via simulations, modeling, and evaluation of advanced technologies; provide early (Advanced Technology Demonstration) assessment of HSI considerations for advanced crew station technology design, automation and decision-aiding, thereby reducing life-cycle costs; optimize HSI designs of highest priority Army technologies and systems including advanced crew station technology design and automation for enhanced Soldier performance and system effectiveness. In addition, demonstrate effects of decision aides, User Centered Design, more effective use of automation in command and control (C2), training and crew automation for accelerated expertise, design concepts to support rapid and enhanced sense-making, and a multilevel performance assessment in support of Air and Missile Defense. *FY 2024 Plans:* Will mature and demonstrate effects of dynamic information processing to enhance aircrew situational awareness, decision-making, and information management. Will assess and mature technologies for performance-based crew workload measurement and task automation, will assess impact of advanced technologies to enhance Soldier performance via large data analytics, and will assess and optimize advanced Soldier displays. Will demonstrate interface design extensions to support enhanced sense making and decision making in AMD C2 operations centers conducting multi-domain operations (MDO). Will develop and demonstrate a concept for supervised automation (supervisory control) in AMD C2 operations centers. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	1.010	-
Accomplishments/Planned Programs Subtotals	18.679	29.300	21.128

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advance d Technology*	**Project (Number/Name)** AL9 *I Holistic Sit Awareness and Dec Making Adv Tech*

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** BP8 *I Future Vertical Lift Air Platform Adv Tech (CA)*		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BP8: *Future Vertical Lift Air Platform Adv Tech (CA)*	-	82.500	94.750	-	-	-	-	-	-	-	0.000	177.250
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Congressional Interest Item funding provided for Future Vertical Lift Air Platform Advanced Technology.

A. Mission Description and Budget Item Justification
 Congressional Interest Item funding provided for Future Vertical Lift Air Platform Advanced Technology.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Joint Tactical Aerial Resupply Vehicle	8.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Joint Tactical Aerial Resupply Vehicle		
Congressional Add: Surface Tolerant Advanced Adhesives	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for FVL Surface Tolerant Adhesives		
Congressional Add: Program Increase - UH-60 Main Rotor Blade Modernization	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for UH-60 Main Rotor Blade Modernization		
FY 2023 Plans: Congressional Interest Item funding provided for UH-60 Main Rotor Blade Modernization		
Congressional Add: 20MM Chaingun Development for FLRAA	8.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for 20MM Chaingun Development for FLRAA		
Congressional Add: Air Launched Turbojet Missile	15.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Air Launched Turbojet Missile		
Congressional Add: Composite Structures	5.000	-

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** BP8 *I Future Vertical Lift Air Platform Adv Tech (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided for Composite Structures		
Congressional Add: Program Increase - Data Refinement and Optimization for Aviation Sustainment	4.500	4.500
FY 2022 Accomplishments: Congressional Interest Item funding provided for Data Refinement and Optimization for Aviation Sustainment		
FY 2023 Plans: Congressional Interest Item funding provided for Data Refinement and Optimization for Aviation Sustainment		
Congressional Add: Degraded Visual Environment	3.500	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Degraded Visual Environment		
Congressional Add: Digital Backbone	5.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Digital Backbone		
Congressional Add: Elastomeric Imaging	3.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Elastomeric Imaging		
Congressional Add: Program Increase - Fleetspace Maintenance Tool	4.500	5.250
FY 2022 Accomplishments: Congressional Interest Item funding provided for Fleetspace Maintenance Tool		
FY 2023 Plans: Congressional Interest Item funding provided for Fleetspace Maintenance Tool		
Congressional Add: Program Increase - Platform Digitization and Maintenance	5.000	7.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Platform Digitization and Maintenance		
FY 2023 Plans: Congressional Interest Item funding provided for Platform Digitization and Maintenance		
Congressional Add: Program Increase - Stretch Broken Carbon Fiber	10.000	10.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for Stretch Broken Carbon Fiber		
FY 2023 Plans: Congressional Interest Item funding provided for Stretch Broken Carbon Fiber		
Congressional Add: Program Increase - UAS Fuel Systems Enhancements	2.000	2.000

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 I 3	**R-1 Program Element (Number/Name)** PE 0603465A I *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** BP8 I *Future Vertical Lift Air Platform Adv Tech (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2022 Accomplishments: Congressional Interest Item funding provided for UAS Fuel Systems Enhancements		
FY 2023 Plans: Congressional Interest Item funding provided for UAS Fuel Systems Enhancements		
Congressional Add: Program Increase - ADDITIVE MANUFACTURING CAPABILITY	-	2.000
FY 2023 Plans: Congressional Interest Item funding provided for Additive Manufacturing Capability		
Congressional Add: Program Increase - ADDITIVE MANUFACTURING FOR FVL	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for Additive Manufacturing for FVL		
Congressional Add: Program Increase - AUTONOMOUS CONFIGURATION MANAGEMENT AND AVIATION RECORDS	-	10.000
FY 2023 Plans: Congressional Interest Item funding provided for AUTONOMOUS CONFIGURATION MANAGEMENT AND AVIATION RECORDS		
Congressional Add: Program Increase - DLC COATINGS FOR RED PHOSPHOROUS OBSCURANTS	-	3.000
FY 2023 Plans: Congressional Interest Item funding provided for DLC COATINGS FOR RED PHOSPHOROUS OBSCURANTS		
Congressional Add: Program Increase - FVL SURFACE TOLERANT ADHESIVES	-	9.000
FY 2023 Plans: Congressional Interest Item funding provided for FVL SURFACE TOLERANT ADHESIVES		
Congressional Add: Program Increase - INDIVIDUAL BLADE AND HIGHER HARMONIC CONTROL	-	22.000
FY 2023 Plans: Congressional Interest Item funding provided for Individual Blade and Higher Harmonic Control		
Congressional Add: Program Increase - Multi-Drone, Multi-Sensor ISR	-	5.000
FY 2023 Plans: Congressional Interest Item funding provided for Multi-Drone, Multi-Sensor ISR		
Congressional Adds Subtotals	82.500	94.750

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** BP8 / *Future Vertical Lift Air Platform Adv Tech (CA)*

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** CA8 *I Adv Rotocraft Armaments Protection Sys*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CA8: *Adv Rotocraft Armaments Protection Sys*	-	1.189	2.862	6.388	-	6.388	1.254	4.169	10.312	12.850	0.000	39.024
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project investigates and demonstrates a holistic lethality solution for Future Vertical Lift (FVL) offensive and defensive applications, focused on but not limited to Future Long Range Assault Aircraft (FLRAA). Develop components for use in multi-role armament solutions for fire control, armament systems, munitions and integration of threat agnostic countermeasures.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Advanced Rotorcraft Armanents Protection System-Future Long Range Assault Aircraft	1.189	2.824	6.388
Description: This effort matures and demonstrates a holistic small caliber lethality solution for FVL offensive applications. Integrates and demonstrates components for use in multi-role armament solutions for fire control, software, and armament systems. *FY 2023 Plans:* Mature use of holistic aviation fire control software and demonstrate fire control architecture and interfaces in conformance with FACE. Improve stabilized mount performance through sub-system level testing including modeling and simulation. *FY 2024 Plans:* Will optimize stabilized mount for weight, performance, size and power integration needs of future aviation platforms. Will demonstrate improved aviation armament system performance from an optimized weapon mount integrated on an air platform. Will validate improved weapon system accuracy and performance for future aviation platforms in a relevant environment. *FY 2023 to FY 2024 Increase/Decrease Statement:*			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CA8 / *Adv Rotocraft Armaments Protection Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.038	-
Description: Funding transferred in accordance with Title 15 USC §638			
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	1.189	2.862	6.388

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*				**Project (Number/Name)** CC4 *I FVL Radar Advanced Technologies*			

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CC4: *FVL Radar Advanced Technologies*	-	3.854	3.342	4.403	-	4.403	-	2.384	2.387	2.413	0.000	18.783
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops Next Generation Reconfigurable Radar Aperture for detection, tracking and precision targeting, navigation and fire control for both reconnaissance, surveillance, and target acquisition (RSTA) and intelligence, surveillance and reconnaissance (ISR).

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Multi-mission Airborne Radar *Description:* Advanced Digital radio frequency (RF) processing integration with final demonstration subsystem and system level radar hardware and software designs. *FY 2023 Plans:* Mature design component characteristics documented in both preliminary and critical design reviews. Component designs as well as system level capability verification completed via component modeling and simulation as well as bench top demonstration. Demonstrate technology readiness level (TRL) 5 integrated components with a traditional tower test of radar modes. *FY 2024 Plans:* Will validate component integration into radar system level capability in a surrogate airframe body. Will conduct flight demonstration of all-weather, day/night, Detect, Identify, Locate, and Report (DILR) capability via a small form factor radar system and Automatic Target Recognition (ATR) capability on surrogate Air Launched Effects (ALE) platform. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.	3.854	3.220	4.403
Title: SBIR/STTR Transfer	-	0.122	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army | **Date:** March 2023
| |

Appropriation/Budget Activity 2040 *I* 3	R-1 Program Element (Number/Name) PE 0603465A *I Future Vertical Lift Advanced Technology*	Project (Number/Name) CC4 *I FVL Radar Advanced Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.854	3.342	4.403

C. Other Program Funding Summary ($ in Millions)
 N/A

Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*				**Project (Number/Name)** CG1 / *Holistic Team Survivability Adv Tech*			

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CG1: *Holistic Team Survivability Adv Tech*	-	6.189	11.898	15.339	-	15.339	16.409	21.261	17.359	17.625	0.000	106.080
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates increased Future Vertical Lift (FVL) Family of Systems Survivability (FoS) in an advanced integrated air defense systems environment through a multi-layered approach. The approach focuses on maturing and demonstrating technologies for reducing aircraft susceptibility and vulnerability during pre-mission planning, mission execution (combat survivability and safety), and post-mission repair and return to service.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Radio Frequency Countermeasures	6.189	6.617	6.918

Description: This effort matures and demonstrates adaptive sensor and countermeasure technologies that provide platform protection against guided threats. It develops software and hardware to increase probability of detection and defeat of threats to aviation platforms using modeling and simulation (M&S), hardware in the loop (HIL) assessment, and field events. It provides integrated software and sensor technologies to counter the characteristics of advanced and agile threats.

FY 2023 Plans:
Demonstrate Radio Frequency (RF) payload via flight demonstration against multiple threat surrogates, concluding in a technology readiness level (TRL) assessment of RF payload. Further optimize RF payload for integration and test in the prototype Air Launched Effect (ALE) platform. Algorithms to optimize payload and platform behaviors will be tested in modeling and simulation environments with previously developed electronic warfare (EW) models for advanced teaming integration.

FY 2024 Plans:
Will exploit advances in chip-scale technology, enabling the replacement of high Size, Weight and Power-Cost, (SWAP-C) analog RF components with low SWAP-C semi-conductor components. Will mature and integrate these next-generation RF components into a payload with enhanced capability. Will improve payload performance against current and emerging threats and provide

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023	
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CG1 / *Holistic Team Survivability Adv Tech*	

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
technical models of the optimized payload. Will demonstrate improved algorithms and payload behaviors of the next-generation payload. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: Holistic End to End Survivability	-	4.980	8.421
FY 2023 Plans: Continue to expand Survivability Against integrated and Networked Threats, Survivability Correlator capabilities. Begin development of Crashworthiness/Crash predictive capabilities. Continue to develop and mature team based survivability architectures, behaviors and component technologies. *FY 2024 Plans:* Will continue to develop and mature team based survivability architectures, behaviors, and component technologies. Will conduct feasibility analysis of integration for Crashworthiness/Crash predictive capabilities into the Survivability Correlator software architecture. Will continue to maturate EO/IR coatings and RF materials for future manned and unmanned platform demonstration. Will continue maturation / demonstration of air vehicle vulnerability reduction technologies. Will demonstrate air-to-air recovery of UAS to host platform. Will continue to mature team based survivability architectures, behaviors, and component technologies. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects additional investments in vulnerability reduction technologies for FVL FoS and the inclusion of unmanned aviation systems. Funding increase will allow for the investigation and development of microclimatology algorithms and behaviors for improved aviation system survivability and increased mission effectiveness.			
Title: SBIR/STTR Transfer	-	0.301	-
Description: Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	6.189	11.898	15.339

C. Other Program Funding Summary ($ in Millions)
N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CG1 *I Holistic Team Survivability Adv Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*				**Project (Number/Name)** CH6 *I Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CH6: *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*	-	4.394	-	-	-	-	-	-	-	-	0.000	4.394
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, and demonstrates advanced autonomy, controls, and structures technologies that provide manned/unmanned Future Vertical Lift (FVL) platforms the decisive tactical overmatch of near-peer adversaries needed for combat mission success. Matures and demonstrates modeling capabilities, control law development, and handling quality criteria required for fully realizing capabilities of advanced configurations of Army aircraft. Develops and demonstrates structures technologies and mission-adaptive autonomy (MAA) and control algorithms that provide level 1 handling qualities, resilience to extreme and hostile environments, damage-mitigation by reconfiguration of redundant controls, increased agility and speed with minimal fatigue, increased payload and weight efficiency, optional pilotage and manned-unmanned teaming capabilities, cognitive off-loading, and reduction of structural maintenance burden.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Adaptive and Resilient Engineered Structures (ARES) Technology Demonstration *Description:* Mature, integrate, and demonstrate advanced structures technologies providing performance, survivability, and sustainment benefits with broad applicability across platform scale and role, enabling mission success for manned/unmanned FVL platforms in the contested environment of multi-domain operations.	3.322	-	-
Title: Adaptive Tactical Autonomy and Control (ATAC) Technology Demonstration *Description:* Mature, integrate, and demonstrate advanced vehicle management, flight control, and autonomy technologies that enable FVL aircraft to achieve superior maneuverability and agility at all speeds, effectively exploit extreme/degraded environmental conditions as a force multiplier, fight and win in presence of failure or damage, and operate on a cognitive-loading-spectrum from piloted to fully autonomous.	1.072	-	-
Accomplishments/Planned Programs Subtotals	4.394	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH6 / *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*			**Project (Number/Name)** CH7 *I Power & Thermal Management for FVL Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CH7: *Power & Thermal Management for FVL Adv Tech*	-	3.278	4.396	4.294	-	4.294	5.448	7.562	5.488	7.098	0.000	37.564
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates at the system level, integrated electrical power technologies (including power generation, distribution, and control along with advanced energy storage) and thermal management technologies to provide significantly higher electrical power capability to Future Vertical Lift (FVL) aircraft while addressing consequential size, weight, pulsed power, and thermal issues. Provides power capability for advanced electric aeromechanical effectors, advanced mission systems that for example, execute algorithms for route planning and teaming, and for advanced survivability and electronic warfare capability. Will demonstrate software-in-the-loop performance of power & thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while addressing consequential SWAP-C & thermal issues.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Optimized Energy for C5ISR Platforms Advanced Technology *Description:* Enable advanced Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) and survivability systems on FVL platforms through component development of improved high power and energy storage technologies, higher capacity lower Size, Weight, and Power (SWaP) cooling systems, and more efficient electrical architectures *FY 2023 Plans:* Optimize control schemes for electrical power systems to safely and effectively deliver power when and where it is needed on FVL aircraft. Iimprove performance of energy storage systems through lighter packaging and improved controls. Maximize energy and power density through use of hybrid schemes sized to support load demands. *FY 2024 Plans:*	1.845	2.005	2.042

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH7 *I Power & Thermal Management for FVL Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will mature and demonstrate electrical power controls that will optimize the availability and efficiency of electrical power sources, including batteries and power generation for power on FVL aircraft; optimize for both performance and safety of energy storage systems through improved packaging for aviation applications. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Power & Thermal Management Tech Demo	1.433	2.310	2.252
Description: Exploits fabrication, and systems integration lab validation testing to Technical Readiness Level (TRL) 6 of power and thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while addressing thermal issues and reducing system weight/volume ***FY 2023 Plans:*** Continue to mature the power and thermal management system components which includes design integration efforts to optimally incorporate advanced system components into a power and thermal management system, providing increased electrical power capability while reducing weight, volume, and cost to Future Vertical Lift aircraft and the enduring fleet. Perform fabrication of advanced power and thermal management system components to be used in component level and system level validation efforts. ***FY 2024 Plans:*** Will continue fabrication of advanced power and thermal management system components and begin fabrication/modification of the systems integration laboratory to be used in component level and system level validation efforts; conduct component level and system level validation efforts, ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.081	-
Description: Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.278	4.396	4.294

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH7 *I Power & Thermal Management for FVL Adv Tech*

C. Other Program Funding Summary ($ in Millions)

 N/A

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** CH8 *I UAS Survivability Adv Technology*	
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CH8: *UAS Survivability Adv Technology*	-	4.872	-	-	-	-	-	-	-	-	0.000	4.872
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project integrates the new technologies of Future Vertical Lift and Air Platform Technologies to address an evolving threat environment by improving Unmanned Aircraft System (UAS) survivability in contested environments. This is achieved without impacting UAS performance through tailored signature management for UAS missions, survivability-enhanced mission profiles, UAS survivability behaviors, resilient systems and architectures and electromagnetic (EM) vulnerability reduction. UAS Survivability Advanced Technology will mature UAS survivability technologies and demonstrate increased UAS Survivability in a peer / near-peer environment with minimal impacts to aircraft performance.

This research supports Future Vertical Lift and Advanced Unmanned Aircraft Systems.

Research in this Project is fully coordinated with Program element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: UAS Survivability Demonstration	4.872	-	-
Description: This effort focuses on maturing UAS susceptibility and vulnerability reduction technologies to provide increased UAS survivability with minimum impacts to mission performance and UAS system cost and addresses the evolving threat environment to support the Maneuver Force within the Multi-Domain Battle concept. Will develop and demonstrate increased UAS Survivability in a peer / near-peer environment with minimal impacts to aircraft performance, with objectives of tailored signature management for UAS missions, survivability-enhanced mission profiles, UAS survivability behaviors, resilient systems/architectures, and EM vulnerability reduction.			
Accomplishments/Planned Programs Subtotals	4.872	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advanced Technology	Project (Number/Name) CH8 / UAS Survivability Adv Technology

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*					**Project (Number/Name)** CJ5 *I Future Vertical Lift Medical Advanced Technology*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CJ5: *Future Vertical Lift Medical Advanced Technology*	-	-	1.031	1.320	-	1.320	1.593	1.595	1.598	1.602	0.000	8.739
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project evaluates, validates, matures and delivers medical guidelines and strategies to assure optimal Soldier performance and protection on the future technologically-intensive battlefield. Key elements of the program include: 1) tailored medical selection and retention standards for Future Vertical Lift (FVL); 2) medical strategies to maintain and enhance human performance in Multi-domain operations (MDO); 3) human-centered technology design guidance to accommodate the range of aircrew; 4) improved protection standards to reduce FVL occupant injury; and 5) operator state monitoring tools to enable scalable autonomy in FVL aircraft.

Efforts in this Project further develop work done in Program Element 0602148A (Future Vertical Lift Technology) / Project BZ7 (Future Vertical Lift Medical Technologies).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Biomedical Strategies to Support Design and Operation of Future Vertical Lift (FVL) Aircraft ***Description:*** This effort evaluates, validates, matures and delivers medical guidelines and strategies to assure optimal Soldier performance and protection on the future technologically-intensive battlefield. Key elements of the program include: 1) tailored medical selection and retention standards for FVL; 2) medical strategies to maintain and enhance human performance in MDO.); 3) human-centered technology design guidance to accommodate the range of aircrew; 4) improved protection standards to reduce FVL occupant injury; and 5) operator state monitoring tools to enable scalable autonomy in FVL aircraft. ***FY 2023 Plans:*** Will validate Health Hazard Assessment methods and criteria to protect FVL occupants from Head Supported Mass, impulsive noise/ shock, and repeated jolt to maintain FVL occupant performance and prevent injury. Will validate human variables for operator state assessment and mature a holistic aircrew workload/ performance stress model. Validate recommendations for Anthropomorphic Test Device (ATD) use in military environments. Validate revised spinal fracture thresholds and FVL aviator/ crew seat requirements. Validate standards for assessing flight helmet stability and crash retention. ***FY 2024 Plans:*** Will validate recommended holistic HSM limits for injury and performance. Will validate human variables for operator state assessment and mature a holistic aircrew workload/ performance stress model. Will validate proposed responses of	-	1.026	1.320

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023		
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advanced Technology	Project (Number/Name) CJ5 / Future Vertical Lift Medical Advanced Technology		

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
autonomous system to FVL aircrew. Will validate package for enhanced FVL crashworthiness. Efforts in this task further develop work done in Program Element 0602148A, Project BZ7. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *FY 2023 Plans:* SBIR/STTR Transfer *FY 2023 to FY 2024 Increase/Decrease Statement:* SBIR/STTR Transfer	-	0.005	-
Accomplishments/Planned Programs Subtotals	-	1.031	1.320

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										**Date:** March 2023	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*						

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	125.027	99.147	21.015	-	21.015	28.277	28.937	16.249	15.233	0.000	333.885
AD1: *High Energy Laser Tactical Vehicle Demo Adv Tech*	-	25.137	-	-	-	-	-	-	-	-	0.000	25.137
AE3: *Unconventional Countermeasures-Survivability ATech*	-	2.890	0.512	11.208	-	11.208	11.839	10.850	0.786	1.244	0.000	39.329
BN7: *Weapons Components Adv Technology (CA)*	-	97.000	88.000	-	-	-	-	-	-	-	0.000	185.000
CV6: *Optimized High Energy Laser Source Adv Tech*	-	-	7.112	6.743	-	6.743	9.727	10.049	8.664	7.058	0.000	49.353
DB3: *Radar Survivability through Dis Sensing Adv Tech*	-	-	3.523	3.064	-	3.064	6.711	8.038	6.799	6.931	0.000	35.066

A. Mission Description and Budget Item Justification

This Program Element (PE) matures demonstrates technology in support of Army Modernization Priority Air and Missile Defense by maturating, demonstrating and conducting system level experimentation for the development of advanced air defense technologies that reduce the cost curve of missile defense, restore overmatch, survive volley-fire attacks, and operate within sophisticated Anti-Access/Area Denial (A2/AD) and contested domains.

Research in this PE complements PE 0602150A (Air and Missile Defense Technology).

This PE is directly aligned to the Air & Missile Defense (AMD) Army Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research is performed by the United States (U.S.) Army Futures Command (AFC), the United States Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT), and the Engineer Research and Development Center (ERDC), and the United States Army Rapid Capabilities and Critical Technologies Office (RCCTO).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army				Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*		

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	145.826	11.147	9.715	-	9.715
Current President's Budget	125.027	99.147	21.015	-	21.015
Total Adjustments	-20.799	88.000	11.300	-	11.300
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	88.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-20.799	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	11.300	-	11.300

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: BN7: *Weapons Components Adv Technology (CA)*		
Congressional Add: *Program Increase - HEL for All-Terrain Vehicles*	5.000	12.000
Congressional Add: *Program Increase - Thermal Management System for High Energy Laser*	12.000	-
Congressional Add: *Program Increase - HEL Risk Reduction*	46.000	-
Congressional Add: *Armored Combat Vehicle HEL Integration*	11.000	-
Congressional Add: *Missile Mentor*	15.000	-
Congressional Add: *Program Increase - Silicon Carbide Electronics*	8.000	8.000
Congressional Add: *Program Increase: Palletized Counter sUAS HEL Weapon System*	-	20.000
Congressional Add: *Program Increase: Weapons Components Advance Technology*	-	20.000
Congressional Add: *Program Increase - MISSILE AI FORCE APPLICATION SYNCHRONIZATION TESTBED*	-	8.000
Congressional Add: *Program Increase - MOBILE FORCE PROTECTION*	-	20.000
Congressional Add Subtotals for Project: BN7	97.000	88.000
Congressional Add Totals for all Projects	97.000	88.000

Change Summary Explanation

Increase in funding to initiate the Assured Protection of Layered Logistics Operations (APoLLO) effort which will mature and demonstrate unconventional countermeasure solutions for joint logistics assets.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 I 3					**R-1 Program Element (Number/Name)** PE 0603466A I Air and Missile Defense Advanced Technology				**Project (Number/Name)** AD1 I High Energy Laser Tactical Vehicle Demo Adv Tech		

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
AD1: *High Energy Laser Tactical Vehicle Demo Adv Tech*	-	25.137	-	-	-	-	-	-	-	-	0.000	25.137
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a greater than 100 kW-class mobile high energy laser (HEL) weapon system on a tactical platform to protect fixed and semi-fixed sites from rocket, artillery and mortar (RAM), unmanned aerial system (UAS), and advanced air defense threats. The major effort under this Project is the phased approach for mobile high power solid state laser (SSL) technology demonstrations that are traceable to the form, fit, and function requirements for a HEL weapon. This effort utilizes open systems architecture to ensure growth, interoperability, and opportunity for technology insertions for maturation of laser, beam control, sensor/radar, integration of power and thermal management subsystems, as well as Battle Management Command, Control, and Computers (BMC3).

Research in this Project complements Program Element (PE) 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Te).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, and the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for directed energy.

Research is performed by the United States (US) Army Rapid Capabilities and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: High Energy Laser Tactical Vehicle Demonstrator (HEL TVD) Advanced Technology	25.137	-	-
Description: This effort integrates and demonstrates HEL technologies on an Army tactical platform for transition to the future Indirect Fire Protection Capability Increment 2-Intercept Program of Record. Effort includes integrating technologies developed under PE 0602307A/AC9 into HEL TVD and demonstrating the system against an array of RAM and UAS targets. Technology and knowledge gained from demonstration will be used to inform prototyping decisions by Army Rapid Capabilities and Critical Technologies Office and future material development decisions by Program Executive Office Missiles and Space.			
Accomplishments/Planned Programs Subtotals	25.137	-	-

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*	**Project (Number/Name)** AD1 *I High Energy Laser Tactical Vehicle Demo Adv Tech*

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*				**Project (Number/Name)** AE3 *I Unconventional Countermeasures-Survivability ATech*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
AE3: *Unconventional Countermeasures-Survivability ATech*	-	2.890	0.512	11.208	-	11.208	11.839	10.850	0.786	1.244	0.000	39.329
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies to increase survivability of personnel and critical assets using integrated unconventional countermeasures. These countermeasures include tone down concepts for signature management using novel materials, rapidly deployable, low-cost, multisprectral survivability enhancement technologies as well as intuitive decision support technologies to select and assess non-kinetic protective measures.

Work in this Project complements Program Element (PE) 0602150A (Air and Missile Defense Technology) / Project AE2 (Unconventional Countermeasures-Survivability Tech).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is conducted by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Development of Unconventional Countermeasures for Enhanced Survivability (DeUCES) Demonstrations	2.650	-	-
Description: This effort matures and demonstrates countermeasures to detect and defeat near-peer advanced weapons through computational simulations and physical countermeasures and enhanced tonedown measures.			
Title: Applications of Environmentally-Inspired Unconventional Countermeasures	0.240	-	-
Description: This effort matures and demonstrates rapidly-deployable, eco-friendly materials with spectral signatures that alter or obscure underlying target spectral signatures.			
Title: Advanced Integrated Unconventional Countermeasures Applications Demonstrations	-	0.512	1.164
Description: This effort demonstrates methods and materials to defeat peer advanced reconnaissance, surveillance, targeting methods through advancements in material science and computational prototyping to reduce targetable signatures and confuse targeting systems. *FY 2023 Plans:*			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603466A / Air and Missile Defense Advanced Technology	Project (Number/Name) AE3 / Unconventional Countermeasures-Survivability ATech

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Demonstrate a system incorporating organic materials for targeting hyperspectral and multispectral sensor bands. And demonstrate advanced thermal generation technologies for lightweight structural panels for integration into survivability enhancement systems. *FY 2024 Plans:* Will demonstrate a prototype system and corresponding auxiliary countermeasures with design influences produced by computational tools developed for signature management applications. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects investments required to demonstrate developments and capabilities available through the prototype system.			
Title: Assured Protection of Layered Logistics Operations (APoLLO) *Description:* This effort matures and demonstrates CREED Kits and other unconventional countermeasures to protect joint logistical assets against emerging and dynamic threats to include expansion of core CREED capabilities to other families of critical assets. *FY 2024 Plans:* Will mature and demonstrate passive unconventional countermeasures systems tailored for fixed logistics assets. Will mature active countermeasures with specific focus on low-cost logistics protection of hard-to-move unique system and subsystems. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding increase reflects initiation of new task to mature and demonstrate unconventional countermeasure solutions for joint logistics assets.	-	-	10.044
Accomplishments/Planned Programs Subtotals	2.890	0.512	11.208

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks
 N/A

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*				**Project (Number/Name)** BN7 *I Weapons Components Adv Technology (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
BN7: *Weapons Components Adv Technology (CA)*	-	97.000	88.000	-	-	-	-	-	-	-	0.000	185.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 Congressional Interest Item funding provided for Weapons Components Advanced Technology.

A. Mission Description and Budget Item Justification
 Congressional Interest Item funding provided for Weapons Components Advanced Technology.

 The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**
Congressional Add: Program Increase - HEL for All-Terrain Vehicles	5.000	12.000
FY 2022 Accomplishments: Program increase supporting advanced technology development of high energy lasers for all-terrain vehicles. Furthers efforts executed under FY 2021 $20M congressional add Program Increase. This project will perform research and development on coherently combined phased array high energy laser advanced weapons technology to support the mobile Counter-small Unmanned Aircraft Systems (C-sUAS) efforts at Army Brigade and below operations. The effort matures current Joint C-sUAS Office supported efforts and will perform graded field demonstrations against relevant targets. Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama. *FY 2023 Plans:* Program increase supporting advanced technology development of high energy lasers for all-terrain vehicles. Furthers efforts executed under FY 2022 congressional add Program Increase.		

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 I 3	R-1 Program Element (Number/Name) PE 0603466A I Air and Missile Defense Advanced Technology	Project (Number/Name) BN7 I Weapons Components Adv Technology (CA)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
This effort provides research and development on advanced weapons technology leading to a high energy laser system for vehicles that support Army Brigade and below operations. It further enables soldiers to have a Counter- small Unmanned Air System (C-UAS) weapon system at the small unit level and requirements put forth by the Joint Counter-UAS Office. The effort builds upon the advanced laser technologies being developed for counter rockets, artillery, and mortars (C-RAM) and to be integrated on larger vehicles (10-ton FMTV). These integrated systems find their best use in all theaters for C-UAS defense applications, a critical deficiency. Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama.		
Congressional Add: Program Increase - Thermal Management System for High Energy Laser *FY 2022 Accomplishments:* Congressional Interest Item funding provided for Thermal Management System for 10KW to 50KW Lasers Program increase supporting advanced technology development of thermal management systems for high energy lasers. This project will improve laser diode fiber amplifier cooling with smaller, lighter and more energy efficient thermal management technology and demonstrate that capability in a relevant environment. This effort continues work in phase change materials and vapor compression technologies to reducing the size, weight, power, and cost of direct energy weapons technologies. Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama.	12.000	-
Congressional Add: Program Increase - HEL Risk Reduction *FY 2022 Accomplishments:* Congressional Interest Item funding provided for IFPC HEL Risk Reduction Program increase supporting advanced technology development of High Energy Laser Risk Reduction. The Indirect Fire Protection Capability-High Energy Laser (IFPC-HEL) pre-prototype demonstrator proves out a 300 kW HEL system in a laboratory by the end of FY 2022. This effort supports the post laboratory demonstration system integration of all subsystems into an enclosure and onto the platform for range / field demonstrations to enable final verification of the system against its defined threat portfolio and potential path forward for follow-on prototype systems to be delivered to the warfighter as residual combat capability. Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama.	46.000	-
Congressional Add: Armored Combat Vehicle HEL Integration	11.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603466A / Air and Missile Defense Advanced Technology	Project (Number/Name) BN7 / Weapons Components Adv Technology (CA)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2022 Accomplishments: Program increase supporting advanced technology development of armored combat vehicle high energy laser integration. This project will provide a system representative high energy laser asset to independently characterize and score Direct Energy systems to validate weapon effectiveness as part of developmental and operational testing, as well as Outside Continental United States (OCONUS) operational assessments. This effort will inform engagement tactics against threat representative Unmanned Aircraft Systems (UAS) and UAS swarms. Enables Rapid Capabilities and Critical Technologies Office (RCCTO) test events for counter UAS activities. Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama.		
Congressional Add: Missile Mentor **FY 2022 Accomplishments:** Congressional Interest Item funding provided for Missile Mentor	15.000	-
Congressional Add: Program Increase - Silicon Carbide Electronics **FY 2022 Accomplishments:** Congressional Interest Item funding provided for Silicon Carbide Electronics **FY 2023 Plans:** Congressional Interest Item funding provided for Silicon Carbide Electronics	8.000	8.000
Congressional Add: Program Increase: Palletized Counter sUAS HEL Weapon System **FY 2023 Plans:** This effort will integrate Palletized High Energy Laser (P-HEL) in a tactically relevant, rugged, transportable and fieldable fixed and semi-fixed command and control configuration. This integrated P-HEL will provide the DoD with mature production prototype 20-kilowatt (kW) Counter- small Unmanned Air Systems (C-sUAS) to provide a solution for the detection, identification, management and mitigation of sUAS threats. This transition positions Army Rapid Capabilities and Critical Technologies Office (RCCTO) to deliver the P-HEL system with residual combat capabilities in support of Joint Warfighting and Interagency Organizations in collaboration with the Joint Counter sUAS Organization (JCO). Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama.	-	20.000
Congressional Add: Program Increase: Weapons Components Advance Technology **FY 2023 Plans:** This effort provides for the integration of a 300- kW class High Energy Laser Weapon System and all subsystems to be transported and prepped for system level testing at White Sands Missile Range (WSMR) in support of Army Integrated Air and Missile Defense. This efforts completes integration of the laser	-	20.000

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603466A / *Air and Missile Defense Advanced Technology*	**Project (Number/Name)** BN7 / *Weapons Components Adv Technology (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
and all subsystems into a container on an Army tactical truck complete with beam director assembly and battery packs - critical for WSMR testing. Work performed by the Rapid Capabilities and Critical Technologies Office (RCCTO), in Huntsville, Alabama.		
Congressional Add: Program Increase - MISSILE AI FORCE APPLICATION SYNCHRONIZATION TESTBED *FY 2023 Plans:* Congressional Interest Item funding provided for MISSILE AI FORCE APPLICATION SYNCHRONIZATION TESTBED	-	8.000
Congressional Add: Program Increase - MOBILE FORCE PROTECTION *FY 2023 Plans:* Congressional Interest Item funding provided for MOBILE FORCE PROTECTION	-	20.000
Congressional Adds Subtotals	**97.000**	**88.000**

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3					**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*				**Project (Number/Name)** CV6 *I Optimized High Energy Laser Source Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CV6: *Optimized High Energy Laser Source Adv Tech*	-	-	7.112	6.743	-	6.743	9.727	10.049	8.664	7.058	0.000	49.353
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates Optimized High Energy Laser Source advanced technology establishing a more affordable laser source for application in High Energy Laser weapon systems. This Project will deliver a lower cost laser weapon source and leverages prior laser source development work to ruggedize and integrate for transition into the Maneuver-Short Range Air Defense Program of Record.

Research in this Project complements other Army Directed Energy efforts conducted under Program Element (PE) 0602150A (Air and Missile Defense Technology) and PE 0603466A (Air and Missile Defense Advanced Technology).

The cited research is consistent with the Army's modernization programs, the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for Directed Energy.

Research is performed by the United States Army Space and Missile Defense Command - Technical Center (USASMDC-TC) in coordination with RCCTO.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Optimized High Energy Laser Source Advanced Technology	-	6.852	6.743

Description: This effort matures and demonstrates Optimized High Energy Laser Source Advanced Technology to demonstrate a more affordable laser source for application in High Energy Laser weapon systems. This effort will provide a low-cost, rugged and compact laser source. Delivering an affordable direct replacement 50 kW-class laser subsystem with 50% efficiency and 80% fractional Power in the Bucket enabling improvements in efficiency and Size, Weight, and Power laser source resulting in a smaller footprint while reducing logistics requirements.

FY 2023 Plans:
This effort will design and integrate a 50 kW class semiconductor high energy laser subsystem module by leveraging commercially available single mode laser diodes. This effort builds on current industry capabilities that utilize spectral beam combining of multimode diode lasers for manufacturing capabilities. Current research efforts in the Army that have proven this concept is feasible will be leveraged in this effort.

FY 2024 Plans:

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Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*	**Project (Number/Name)** CV6 *I Optimized High Energy Laser Source Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
This effort will continue improvement and complete the integration of the 50 kW-class semiconductor high energy laser subsystem module with a focus on validating performance of components and subsystems as they are integrated. Initiate plans to integrate the 50 kW-class laser module into a testbed for field demonstration the following year. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease in funding reflects the planned lifecycle of this effort.			
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638.	-	0.260	-
Accomplishments/Planned Programs Subtotals	-	7.112	6.743

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	
Appropriation/Budget Activity 2040 *I* 3				**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*					**Project (Number/Name)** DB3 *I Radar Survivability through Dis Sensing Adv Tech*		
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
DB3: *Radar Survivability through Dis Sensing Adv Tech*	-	-	3.523	3.064	-	3.064	6.711	8.038	6.799	6.931	0.000	35.066
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, and demonstrates critical radar capability enhancements to defeat advanced Air and Missile threats and protect Army maneuver forces and critical assets. Radar enhancements are required for advanced Electronic Protection (EP) techniques against advanced jammers, electronic Combat Identification (CID), and resource optimization across the threat spectrum while retaining 360 degree coverage capability. Technology maturation in the project includes providing capabilities for: dispersed multi-static operation, classifying/tracking emerging threats and high volume threats; adaptive digital beam forming to enable resource efficiency, performance in a dynamic clutter environment and enhanced survivability in a contested battlespace; and multi-modal tracking and additional discrimination models to support diverse and emerging threats, such as swarms and guided munitions. Multiple soldier touchpoints and demonstrations of developed technology to autonomously synchronize multiple radars across a distributed battlefield in the presence of countermeasures and the denial of Global Positioning System (GPS) will be performed in lab and field environments.

This research is coordinated with Army Program Element (PE) 0602141A (Lethality Technology) / Project CG4 (Advanced Radar Concepts and Technologies); PE 0602148A (Future Vertical Lift Technology) / Project CC3 (FVL Radar Technologies); PE 0602150A (Air and Missile Defense Technology) / Project AD5 (Next Generation Fires Radar Technology); and PE 0601102A (Defense Research Sciences) / Project AA8 (Sensing and Electromagnetics).

This Research complements Program Element (PE) 0602141A (Lethality Technology) / Project CJ7 (Future Air Defense Missile Enabling Tech) and PE 0602150A (Air and Missile Defense Technology) / Project DA9 (Radar Survivability through Dis Sensing Tech).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Title: Radar Survivability through Dis Sensing (RSDS) Adv Tech	-	3.394	3.064
Description: Matures, and demonstrates critical radar capability enhancements to defeat advanced Air and Missile threats and protect Army maneuver forces and critical assets.			
FY 2023 Plans:			

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603466A *I Air and Missile Defense Advanced Technology*	**Project (Number/Name)** DB3 *I Radar Survivability through Dis Sensing Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Will mature RSDS software and evaluate utilizing high fidelity simulations representative of current and future Army Air Defense radars. Will begin to generate test concepts and demonstration plans for multi-static radar operations. *FY 2024 Plans:* Will select and execute RSDS technology demonstrations of critical capabilities to generate performance metrics. Initial tactical M&S and live demonstrations in the field will incorporate soldier touch points to compare multi and mono-static operations. User feedback early in the technology development process will ensure developed technology is interoperable with Air Defense radars through software built to avoid costly hardware modifications. Utilize the low-cost distributed sensing multi-static Radar testbed S&T development to assess performance and inform future requirements. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638 *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638	-	0.129	-
Accomplishments/Planned Programs Subtotals	-	3.523	3.064

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											**Date:** March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*						**R-1 Program Element (Number/Name)** PE 0603920A *I Humanitarian Demining*						
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	18.684	21.000	9.068	-	9.068	9.253	9.357	9.363	9.465	0.000	86.190
CD5: *Humanitarian Demining*	-	18.684	21.000	9.068	-	9.068	9.253	9.357	9.363	9.465	0.000	86.190

A. Mission Description and Budget Item Justification

This Program Element (PE) develops, demonstrates and validates cost-effective technologies for use in humanitarian demining via Outside Continental United States (OCONUS) operational field evaluations. This PE's low-cost and highly effective technology reduces the landmine and unexploded ordnance (UXO) / improvised explosive devise (IED) threat to deployed United States (US) forces and the local population. This PE coordinates with the Department of State's Weapons Removal and Abatement Program, the Department of Defense (DoD) Humanitarian Mine Action (HMA) programs of the Combatant Commands (CCMDs), and international mine action organizations and foreign militaries. New technology requirements and areas of emphasis are identified and validated at annual Requirements Workshop and UXO/IED Working Group Meetings. Technology investments are prioritized using the results of these meetings and CCMD security cooperation and theater campaign plan HMA objectives. This PE advances the state-of-the-art of demining technologies and evaluates these technologies utilizing host nation humanitarian demining partners.

This PE supports and bolsters the CCMD stability operations mission as directed under Department of Defense Instruction (DODI) 3000.05 to foster mil-to-mil engagement, and bolster economic security and development with partner nations worldwide. Additionally, this PE fosters nations' mine action capacity while improving DoD's visibility and access, generating long-term positive perceptions of DoD and the US, and fostering collaborative relationships with host nation governments. It also directly supports the National Defense Strategy through ensuring common domains remain open and free.

This PE utilizes a research and development plan based on operational test data gained through Operational Field Evaluations (OFEs). These OFEs provide this PE a unique capability to collect this data against live mines/UXO in actual minefields around the world. This data is unavailable to any other DoD organization. This OFE data drives future humanitarian demining investment decisions and is shared and leveraged by the U.S. Army's Army Futures Command programs to further improve U.S. forces' technologies. In addition, this PE provides mine and UXO detector training to the CCMDs at the Humanitarian Demining Training Center (HDTC) in support of Military to Military training and partnerships. Since 1995 the program has fielded technologies for 234 evaluations in 43 countries, including Afghanistan, Angola, Cambodia, Colombia, Iraq, Kosovo, Ukraine, and Vietnam. This program's technologies have cleared 71.2 million square meters of the world's toughest minefields, and found or destroyed 213,220 mines and UXO.

This PE supports the DoD's strategic guidance to address instability and reduce the demand for significant US force commitments to stability operations; with DOD) 3000.05 (Stability Operations) and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3207.01C (Department of Defense Support to Humanitarian Mine Action) to reduce the social, economic and environmental impact of landmines and unexploded ordnance.

This PE will be executed by the Army Futures Command (AFC).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army			Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603920A *I Humanitarian Demining*	

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	19.000	8.933	9.028	-	9.028
Current President's Budget	18.684	21.000	9.068	-	9.068
Total Adjustments	-0.316	12.067	0.040	-	0.040
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	12.067			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.316	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.040	-	0.040

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2022	FY 2023
Project: CD5: *Humanitarian Demining*		
Congressional Add: *Program Increase*	10.351	12.067
Congressional Add Subtotals for Project: CD5	10.351	12.067
Congressional Add Totals for all Projects	10.351	12.067

Change Summary Explanation
Increased funding due to revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										**Date:** March 2023	

Appropriation/Budget Activity 2040 / 3				**R-1 Program Element (Number/Name)** PE 0603920A / *Humanitarian Demining*				**Project (Number/Name)** CD5 / *Humanitarian Demining*			

COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
CD5: *Humanitarian Demining*	-	18.684	21.000	9.068	-	9.068	9.253	9.357	9.363	9.465	0.000	86.190
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops, demonstrates and validates cost-effective technologies for use in humanitarian demining via Outside Continental United States (OCONUS) operational field evaluations. This Project's low-cost and highly effective technology reduces the landmine and unexploded ordnance (UXO) / improvised explosive devise (IED) threat to deployed United States (US) forces and the local population. This Project coordinates with the Department of State's Weapons Removal and Abatement Program, the Department of Defense (DoD) Humanitarian Mine Action (HMA) programs of the Combatant Commands (CCMDs), and international mine action organizations and foreign militaries. New technology requirements and areas of emphasis are identified and validated at annual Requirements Workshop and UXO/IED Working Group Meetings. Technology investments are prioritized using the results of these meetings and CCMD security cooperation and theater campaign plan HMA objectives. This Project advances the state-of-the-art of demining technologies and evaluates these technologies utilizing host nation humanitarian demining partners.

This Project supports and bolsters the CCMD stability operations mission as directed under Department of Defense Instruction (DODI) 3000.05 to foster mil-to-mil engagement, and bolster economic security and development with partner nations worldwide. Additionally, this Project fosters nations' mine action capacity while improving DoD's visibility and access, generating long-term positive perceptions of DoD and the US, and fostering collaborative relationships with host nation governments. It also directly supports the National Defense Strategy through ensuring common domains remain open and free.

This Project utilizes a research and development plan based on operational test data gained through Operational Field Evaluations (OFEs). These OFEs provide this Project a unique capability to collect this data against live mines/UXO in actual minefields around the world. This data is unavailable to any other DoD organization. This OFE data drives future humanitarian demining investment decisions and is shared and leveraged by the U.S. Army's Army Futures Command programs to further improve U.S. forces' technologies. In addition, this Project provides mine and UXO detector training to the CCMDs at the Humanitarian Demining Training Center (HDTC) in support of Military to Military training and partnerships. Since 1995 the program has fielded technologies for 234 evaluations in 43 countries, including Afghanistan, Angola, Cambodia, Colombia, Iraq, Kosovo, Ukraine, and Vietnam. This program's technologies have cleared 71.2 million square meters of the world's toughest minefields, and found or destroyed 213,220 mines and UXO.

This Project supports the DoD's strategic guidance to address instability and reduce the demand for significant US force commitments to stability operations; with DOD) 3000.05 (Stability Operations) and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3207.01C (Department of Defense Support to Humanitarian Mine Action) to reduce the social, economic and environmental impact of landmines and unexploded ordnance.

This Project will be executed by the Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2022	**FY 2023**	**FY 2024**
Title: Humanitarian Demining Technologies	8.333	8.607	9.068

Exhibit R-2A, **RDT&E Project Justification:** PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 *I* 3	**R-1 Program Element (Number/Name)** PE 0603920A *I Humanitarian Demining*	**Project (Number/Name)** CD5 *I Humanitarian Demining*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2022**	**FY 2023**	**FY 2024**
Description: This effort adapts commercial-off-the-shelf equipment, integrates mature technologies, and leverages research and development activity within the Army, particularly the AFC CCDC Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) Tactical Countermine mission area. This effort supports the DoD HMA programs of the CCMDs and aims to improve existing technologies for mine/UXO detection, technical survey/area reduction, mechanical mine/UXO clearance, vegetation clearance, and mechanical mine neutralization. *FY 2023 Plans:* Develop and mature technologies to improve mine/UXO detection, vegetation clearance, and mechanical mine neutralization capabilities. Demonstrate and validate emerging mine/UXO defeat technologies and capabilities in live threat environments. Continue execution of threat surveys and site assessments. Execute annual HD R&D requirements workshop to define global technology needs for humanitarian mine action. Continue the ongoing successful operational evaluations from FY22. *FY 2024 Plans:* Will develop and mature technologies to improve mine/UXO detection, vegetation clearance, and mechanical mine neutralization capabilities in support of Geographic Combatant Command humanitarian mine action priorities. Will demonstrate and validate emerging mine/UXO defeat technologies and capabilities in live threat environments. Will continue operational field evaluations from FY2023 of emerging mine / UXO defeat technologies. Will transition new detection and mechanical clearance technologies to six additional countries for use in clearance operations. Will continue execution of threat surveys and site assessments. Will conduct biannual Humanitarian Demining R&D UXO Working Group Meeting to prioritize global needs for UXO detection and clearance technologies. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer *Description:* Funding transferred in accordance with Title 15 USC §638. *FY 2023 Plans:* Funding transferred in accordance with Title 15 USC §638. *FY 2023 to FY 2024 Increase/Decrease Statement:* Funding transferred in accordance with Title 15 USC §638.	-	0.326	-
Accomplishments/Planned Programs Subtotals	8.333	8.933	9.068

	FY 2022	**FY 2023**	
Congressional Add: Program Increase	10.351	12.067	

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		**Date:** March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603920A / *Humanitarian Demining*	**Project (Number/Name)** CD5 / *Humanitarian Demining*

	FY 2022	**FY 2023**
FY 2022 Accomplishments: Congressional Interest Item funding provided		
FY 2023 Plans: Congressional Interest Item funding provided		
Congressional Adds Subtotals	10.351	12.067

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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